MY SPORTS DIETITIAN

Eat 2 Win Nutrition

Eating Habits of Young Athletes: How to Solve the Complex Puzzle

Tavis Piattoly, MS, RD, LDN
Sports Dietitian

Top 10 Challenges that Impact a Young Athlete's Sports Performance

Top 10 Challenges for the Young Athlete

#1 30% ***DO NOT*** eat breakfast.

Reasons Why?

46% No Time

54% No Appetite

Reference: *My Sports Dietitian*

Top 10 Challenges for the Young Athlete

#2 Limited time

- Rules against eating/drinking during class
- ~30 minutes for lunch often with long lines
- Limited time between classes
- Rush to get to practice

Top 10 Challenges for the Young Athlete

#3 50% eat **alternative school lunch.**

~650 calories

Alternative School Lunch

i.e. Chicken Sandwich, Hamburger w/ Fries, or Pizza Slice

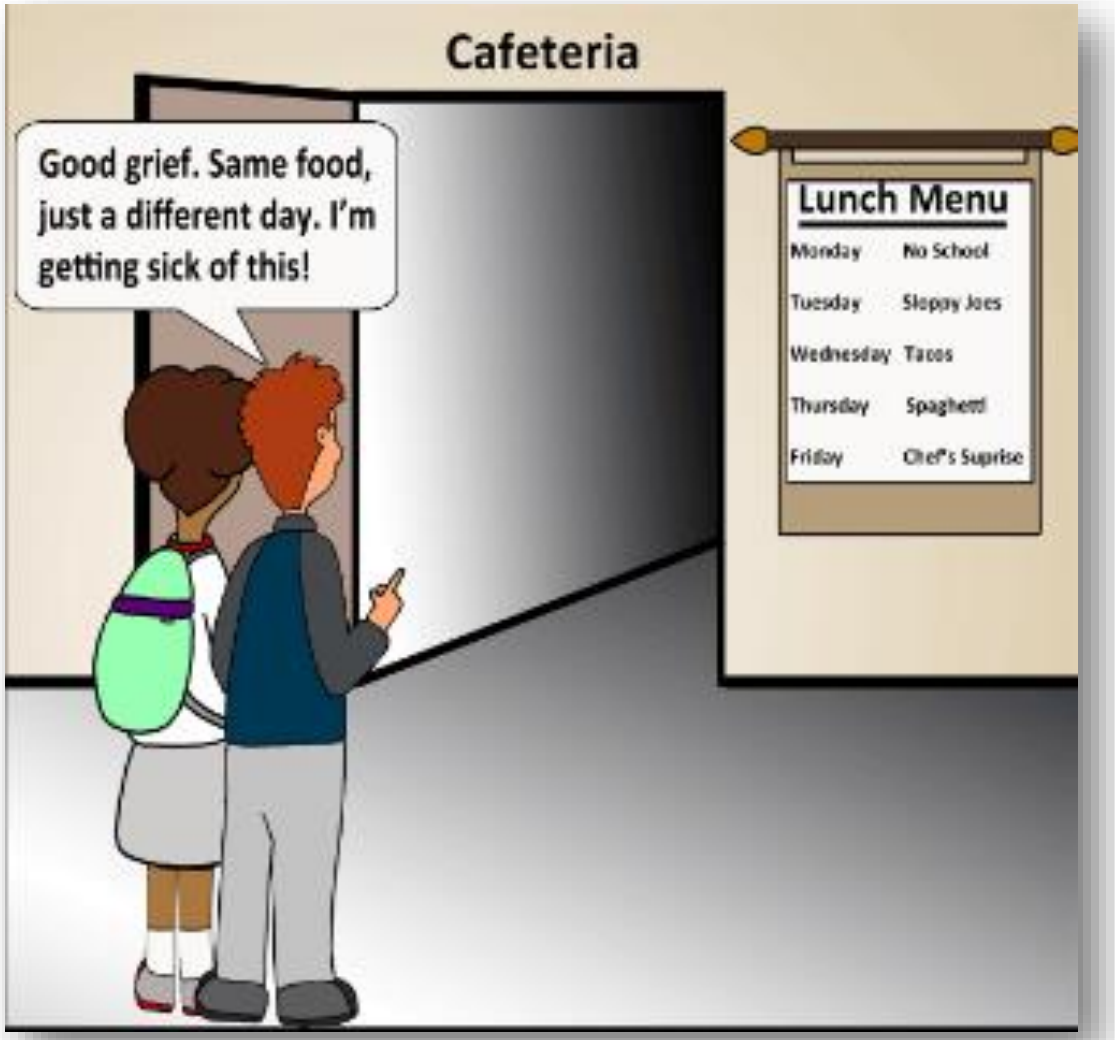
~850 calories

Regular School Lunch

Reference: *My Sports Dietitian*

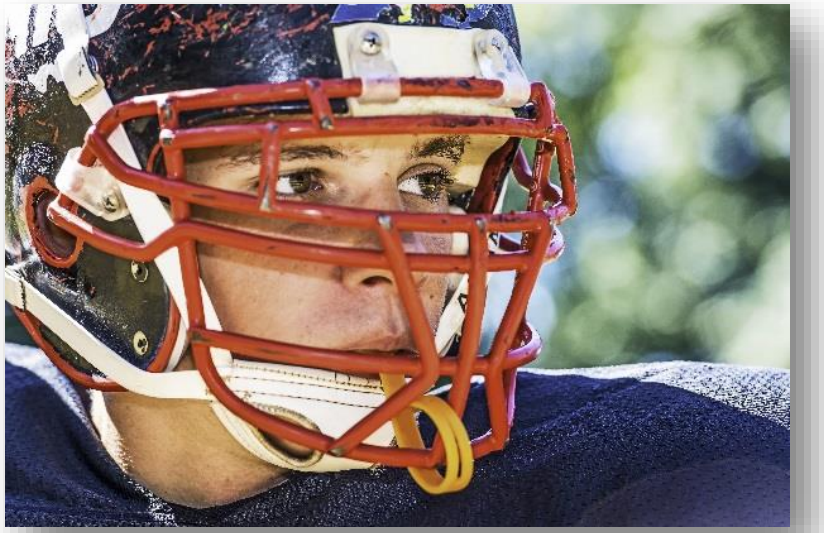
Top 10 Challenges for the Young Athlete

#4 ***Same pattern*** *of meals gets old quick.*



Top 10 Challenges for the Young Athlete

#5 Most athletes go into a practice on **<1000 calories** and struggle to maintain high energy levels.



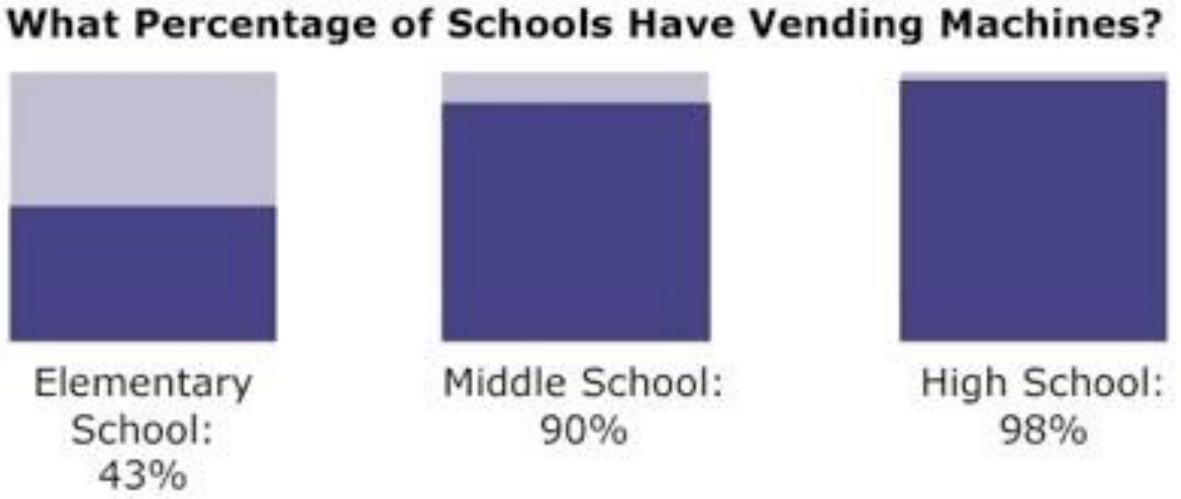
Top 10 Challenges for the Young Athlete

#6 **Often dehydrated** going into practice or workout.

- 30% do not eat breakfast
- Limited time between classes to hydrate
- Limited opportunities for fluid intake during class

Top 10 Challenges for the Young Athlete

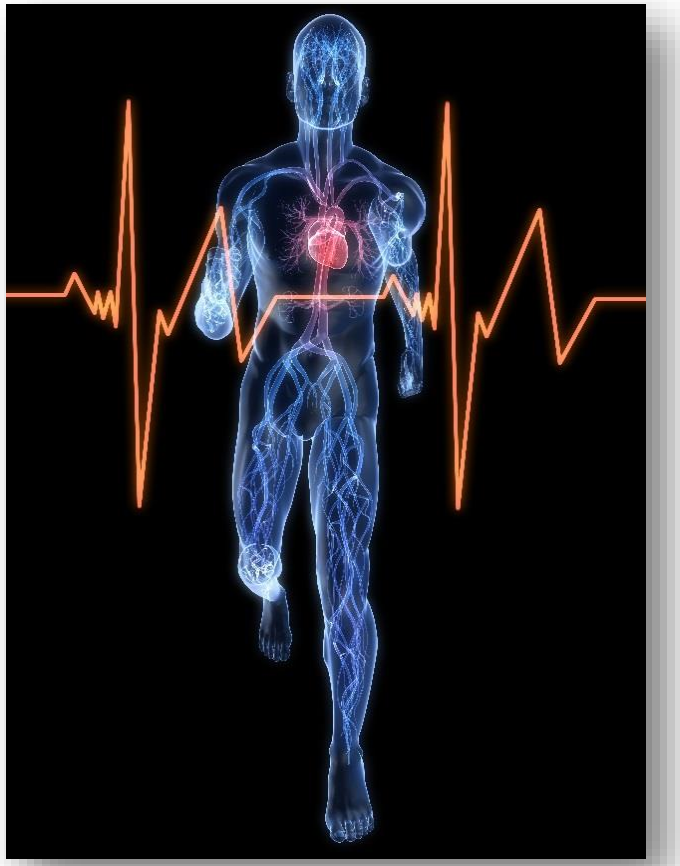
#7 **Very little food available** (athlete is often on High School campus ~11+ hours a day) and vending is usually only option.



98% of High Schools in USA offer Vending Options

Top 10 Challenges for the Young Athlete

#8 Common for athletes to **lose ~6-8 lbs.** during their sport season due to high caloric demands.



Reference: *My Sports Dietitian*

Top 10 Challenges for the Young Athlete

#9 Calories after practice are **heavy in fluid consumption** which reduces the chance for high quality calories from food.

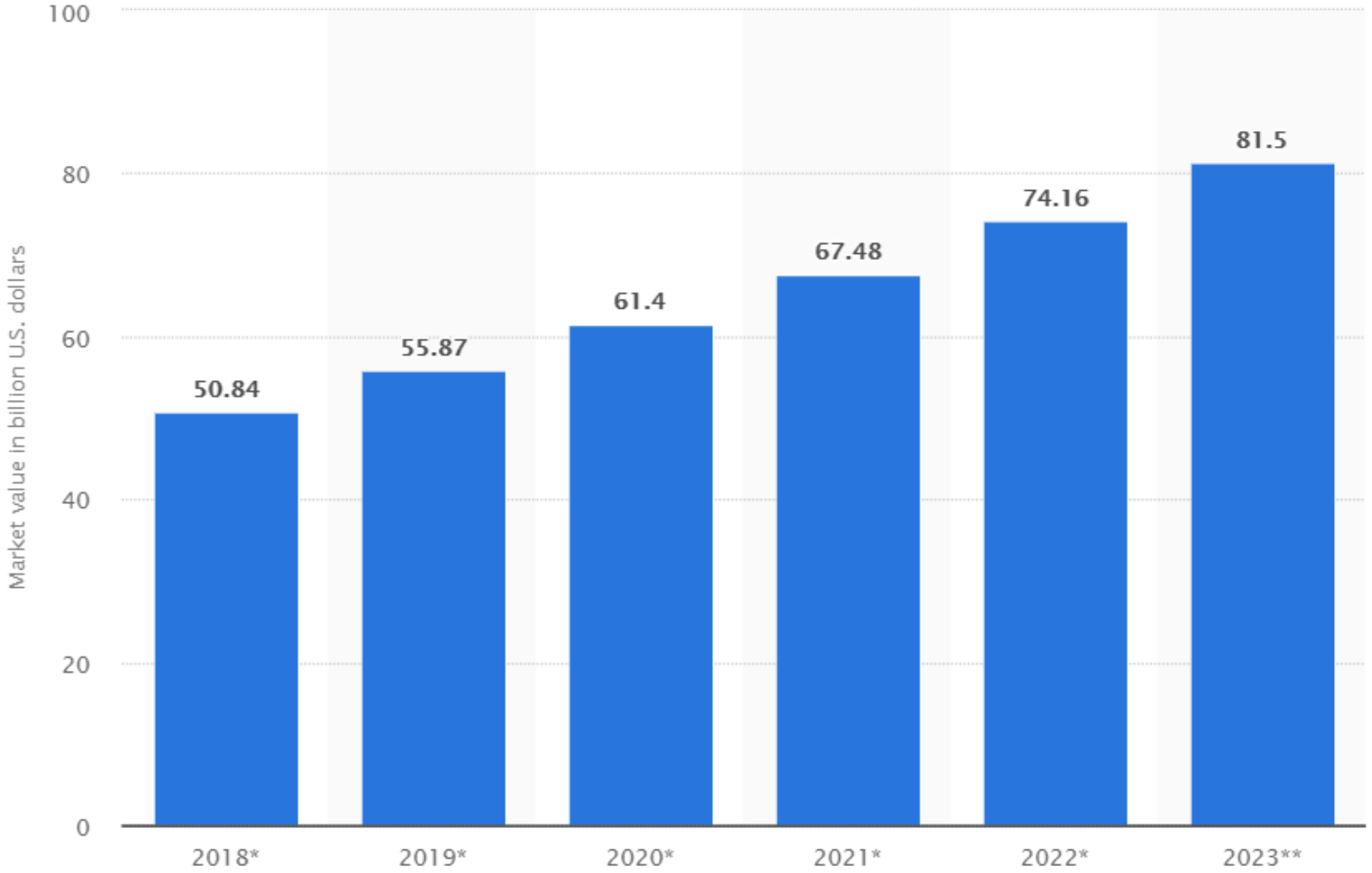
Top 10 Challenges for the Young Athlete

#10 Looking for a solution to improve performance gains, 35% of high school athletes report **taking supplements.**

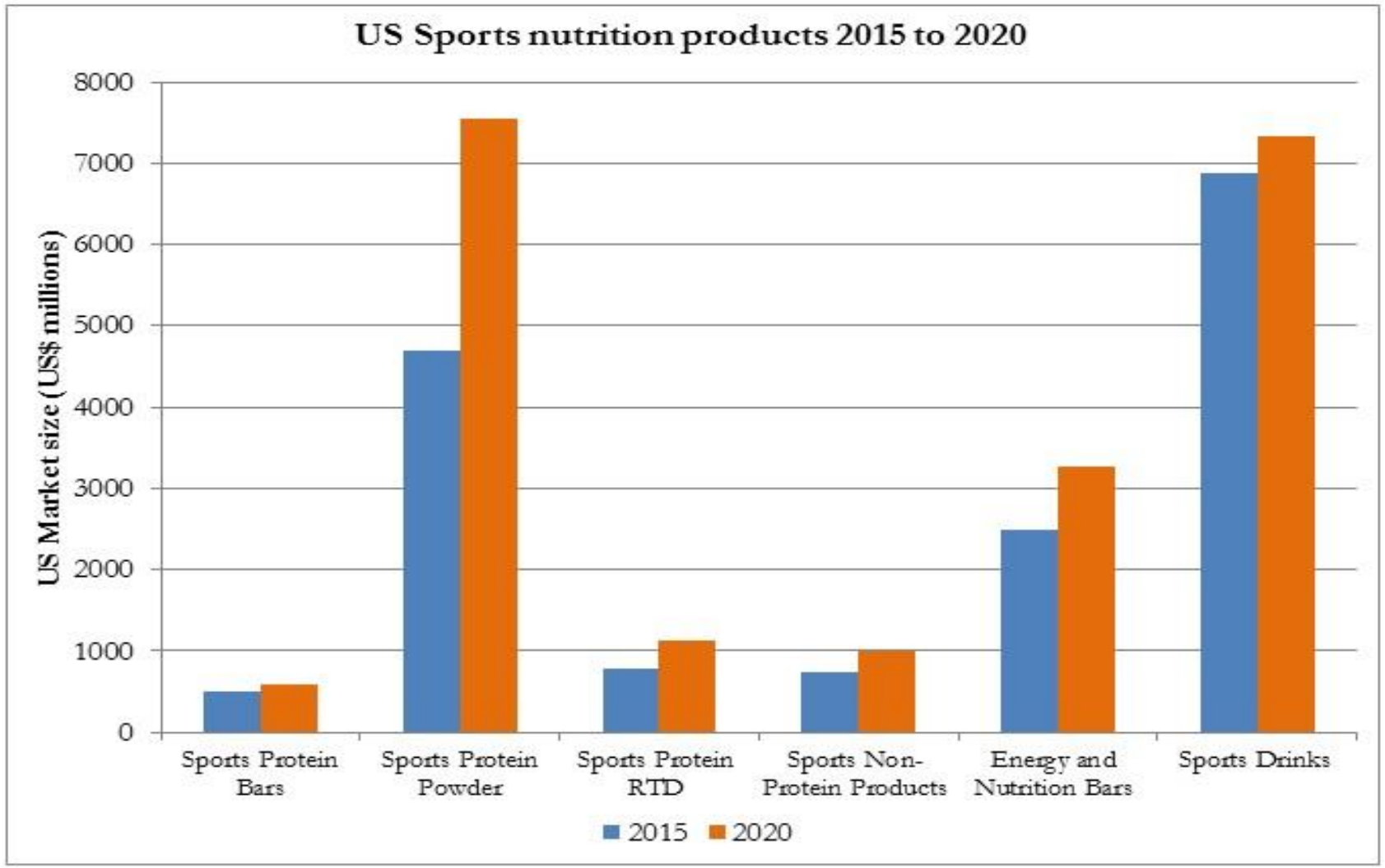
What would you say is the #11th Challenge that impacts a Young Athlete's Sports Performance?

Problem: Trying to Use Supplements to Solve the Problem

Global Sports Supplement Projections



Supplement Industry

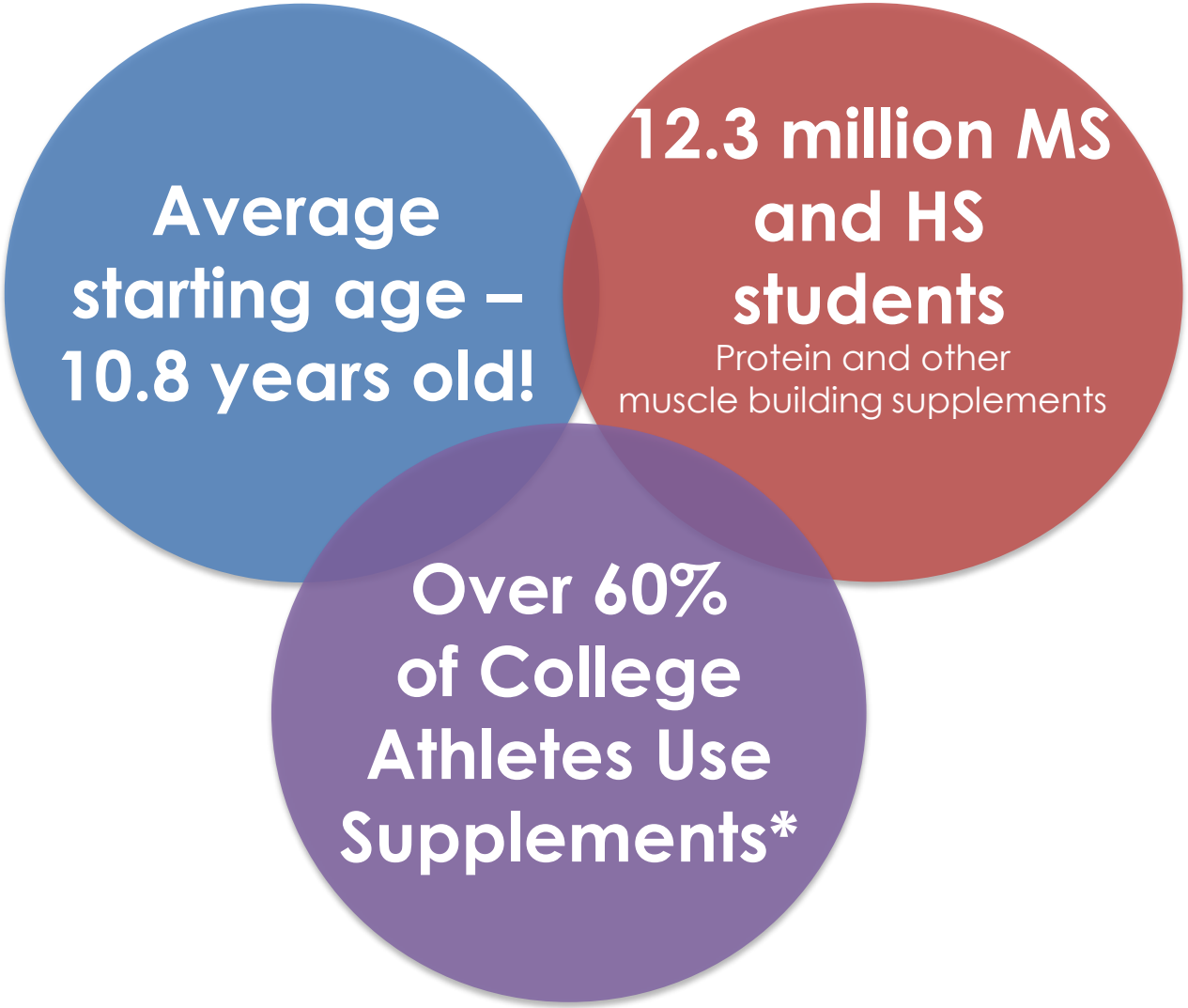


U.S. Supplement Market

- “Buyer Beware” environment
- Over 50,000 supplements
- Target vulnerable people by false claims
  - Reduction in body fat
  - Increase strength
  - Boosting energy
  - Rapid fat loss
  - Increase muscle
  - Faster recovery

*Nutra Ingredients USA

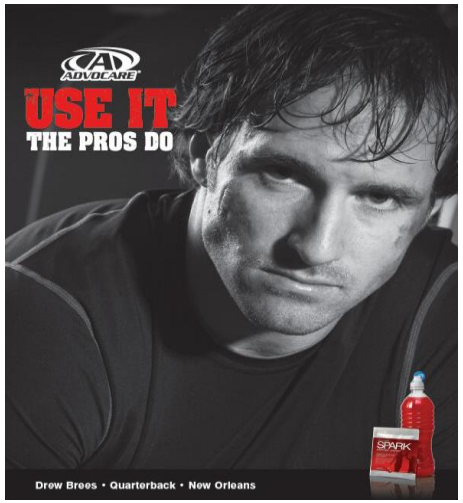
The Problem Begins



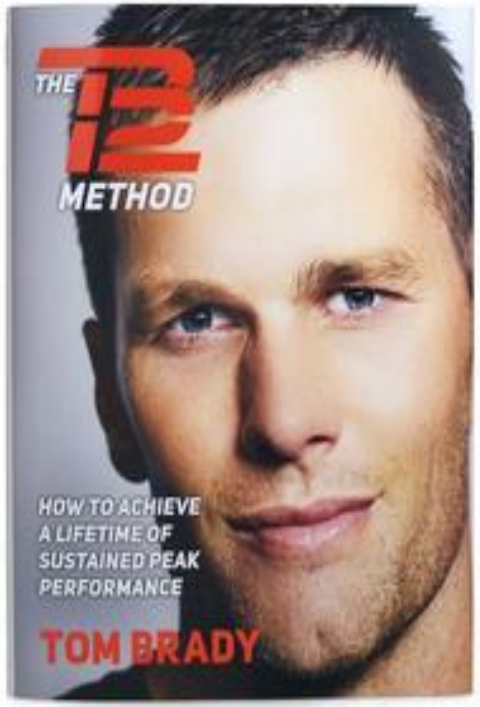
*Drug Free Sport

Why Do Young Athletes Use Supplements?

- **Athlete Influence**
- **Role Models**



Why do young athletes take supplements?



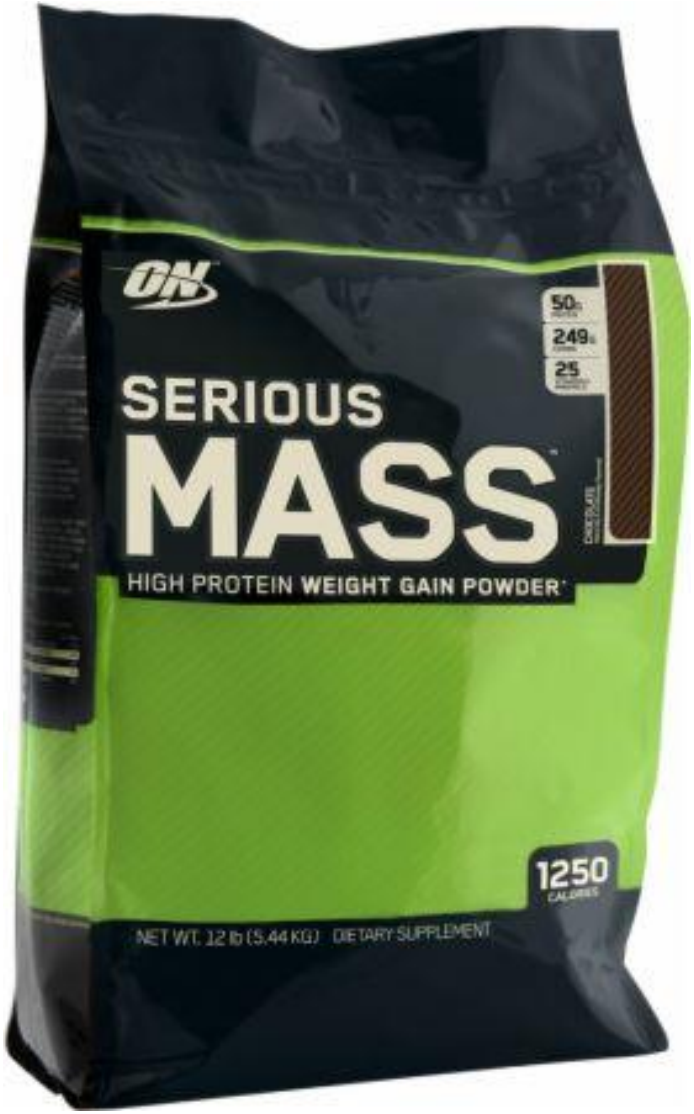
Why Do Young Athletes Use Supplements?

- **Great Marketing**
  - Celebrity power
  - Personal anecdotal testimonials
  - Teammate outcomes

Why Do Young Athletes Use Supplements?

- **Poor Eating Habits**
  - Infrequent eating patterns
  - Constant calorie deficit
  - Insufficient nutrient intake

- **Excessive Activity**
  - Year round activity
  - Calorie Output > Calorie Input



Why Do Young Athletes Use Supplements?

- **Pressure to win**
  - Parents and Coaches
- **Potential college scholarship**
- **Gain Competitive Edge**
  - Strength, Performance, Mass, etc.
- **Peer Pressure from teammates**
- **Physique/Appearance**

Reasons for Taking

“Consider very Important”

- Improve Strength – 60%
- Improve Muscle Mass – 50%
- Improve Athletic Performance – 50%
- Improve Energy – 38%
- Improve Physique – 38%
- Decrease body fat – 22%

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Nutrition App

Reasons for Taking "Very Influential"

- Parents – 22%
- Coaches – 19%
- Teammates – 16%
- Friends – 15%
- Nutritionist/Dietitian – 11%
- Doctor – 9%
- Favorite Athlete – 7%
- Mass – 6%
- TV/Radio – 4%
- Teacher – 2%

Supplement Concerns

- **Supplement Knowledge of the HS Athlete**
  - Duellman et al. *J. Str Cond Res (*2008) reported HS athletes taking protein supplements **had greater misconception of use vs. Non-protein supplement users**
  - Protein supplement users indicated added protein was required to “gain as much as possible”
  - **Source of info:** Coaches, Parents, Friends

Eat 2 Win
Nutrition App

Dietary Supplement Use Concerns

- **<u>Supplement Store Staff lack education</u>**
  - Don’t understand the ingredient list
  - Not familiar with 3rd party certified products/testing
  - No medical or supplement education
  - Commission driven

Eat 2 Win
Nutrition App

Dietary Supplements and Young Teens: Misinformation and Access Provided by Retailers

Maguire Herriman, Laura Fletcher, Alexis Tchaconas, Andrew Adesman, MD, Ruth Milanaik, DO

abstract

BACKGROUND AND OBJECTIVE: Despite the American Academy of Pediatrics' recommendations against pediatric use of creatine and testosterone boosters, research suggests that many young teenagers take these dietary supplements. Our objective was to determine to what extent health food stores would recommend and/or sell creatine and testosterone boosters to a 15-year-old boy customer.

METHODS: Research personnel posing as 15-year-old high school athletes seeking to increase muscle strength contacted 244 health food stores in the United States via telephone. Researchers asked the sales attendant what supplements he/she would recommend. If a sales attendant did not mention creatine or testosterone boosters initially, each of these supplements was then specifically asked about. Supplement recommendations were recorded. Sales attendants were also asked if a 15-year-old could purchase these products on his own in the store.

RESULTS: A total of 67.2% (164/244) of sales attendants recommended creatine: 38.5% (94/244) recommended creatine without prompting, and an additional 28.7% (70/244) recommended creatine after being asked specifically about it. A total of 9.8% (24/244) of sales attendants recommended a testosterone booster. Regarding availability for sale, 74.2% (181/244) of sales attendants stated a 15-year-old was allowed to purchase creatine, whereas 41.4% (101/244) stated one could purchase a testosterone booster.

CONCLUSIONS: Health food store employees frequently recommend creatine and testosterone boosters for boy high school athletes. In response to these findings, pediatricians should inform their teenage patients, especially athletes, about safe, healthy methods to improve athletic performance and discourage them from using creatine or testosterone boosters. Retailers and state legislatures should also consider banning the sale of these products to minors.

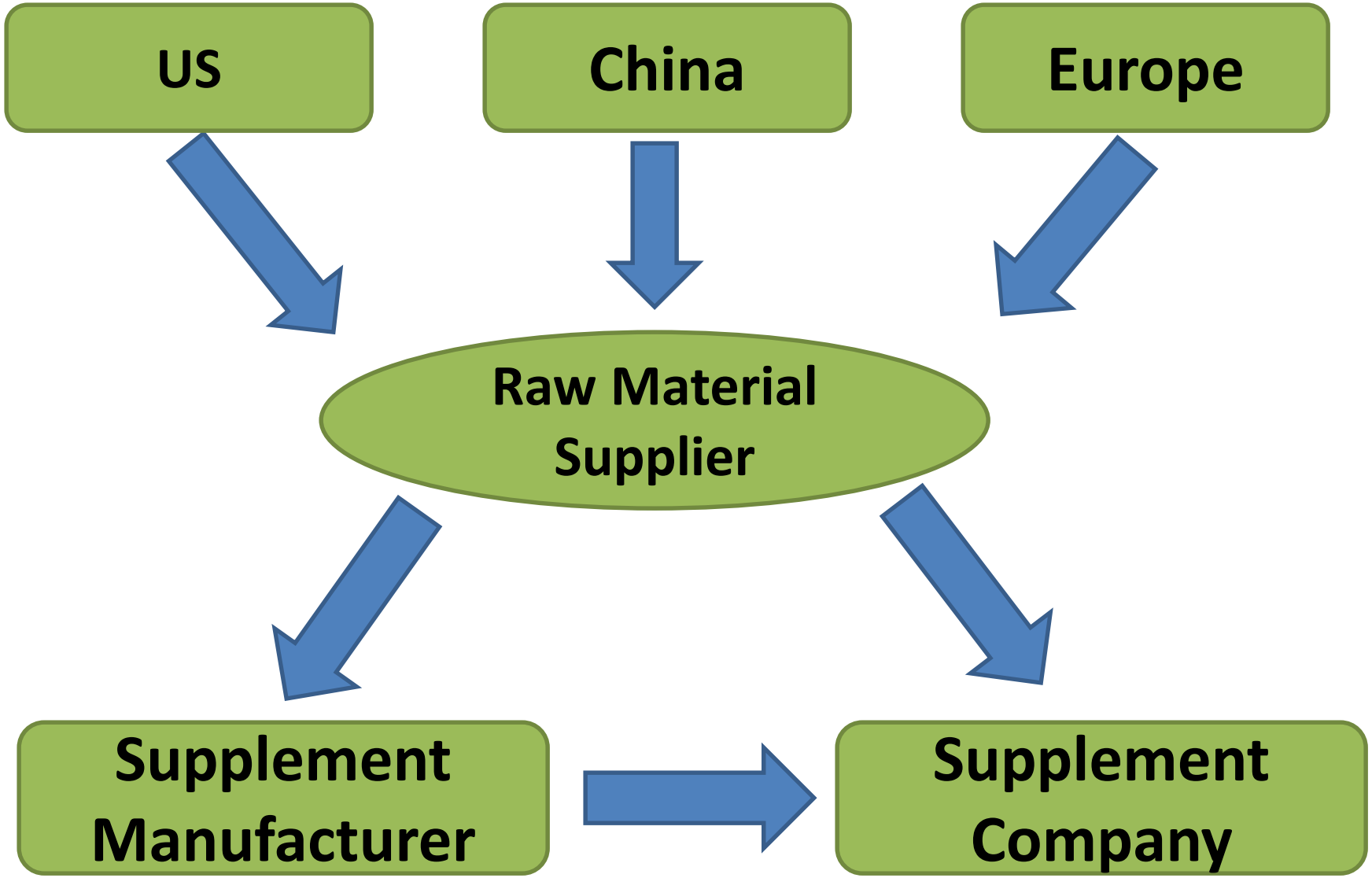
FREE

Objective:
Determine if a health food store staff would recommend or sell Creatine and Testoserone Boosters to a 15 year old customer

Methods:
- Research personnel posed as a 15 year old HS Athlete trying to gain weight
- Contacted 244 health food stores

Results:
- 67.2% recommended Creatine
- 38.5% w/o prompting/28.7% when asked
- 9.8% recommended a T-Booster
- 41.8% allowed T-Booster purchase

Raw Materials



Supplement Raw Materials

- Products come in the form of:
  - Powders
  - Liquids
- Finished Products come in form of
  - Powders
  - Liquids
  - Gels
  - Softgels
  - Tablets
  - Chewables
  - Capsules

Supplement Manufacturers

- **Follows the Rules**
  - FDA and NSF Certifications
  - Facility is inspected
  - Don’t carry banned substances
  - Regularly clean and inspect machines

- **Don’t Follow the Rules**
  - No or limited certifications
  - Lack of regulation/inspection
  - Carries banned substances
  - Don’t always clean machines after use
  - Higher Risk of Cross-Contamination

How do Supplements get Adulterated?

Deliberate

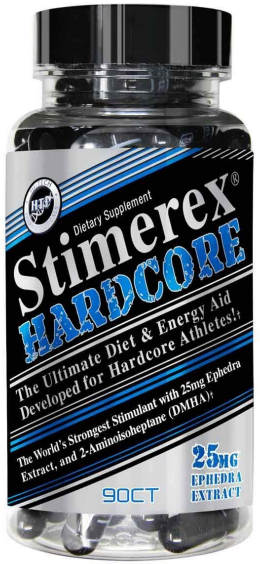
- Intention to use a banned substance in their product
  - Increases results/marketing
- ***May hide the ingredient from supplement label***
- May list the ingredient under a different chemical form to confuse customer

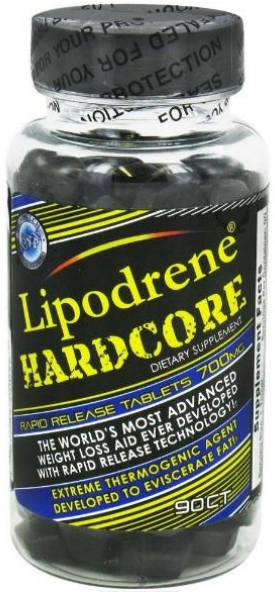
Cross-Contamination

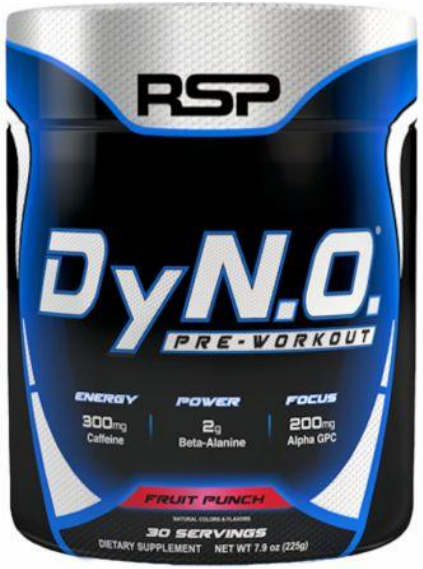
- Manufacturer may create a Pre-Workout with a banned substance
- Doesn't clean machine after use
- Cross-Contaminates the next product

Potentially Hazardous Supplements/Drinks

- **Pre-Workout Supplements**
- **Energy Drinks**
- SARMs
- Prohormones
- **Weight loss products/Stimulants**
- Products Containing DMAA – Banned but still circulating







PRE-WORKOUT SUPPLEMENTS

Pre-Workout Boosters

- Companies are scamming consumers
- Packing supplements with high doses of Caffeine
- Adding small and ineffective doses of supplements of benefit (Creatine, L-Citrulline, Beta-Alanine)
- Adding ingredients with little to no science to support using (i.e. Arginine,
- Consumers are getting a great workout pump so they feel product is working

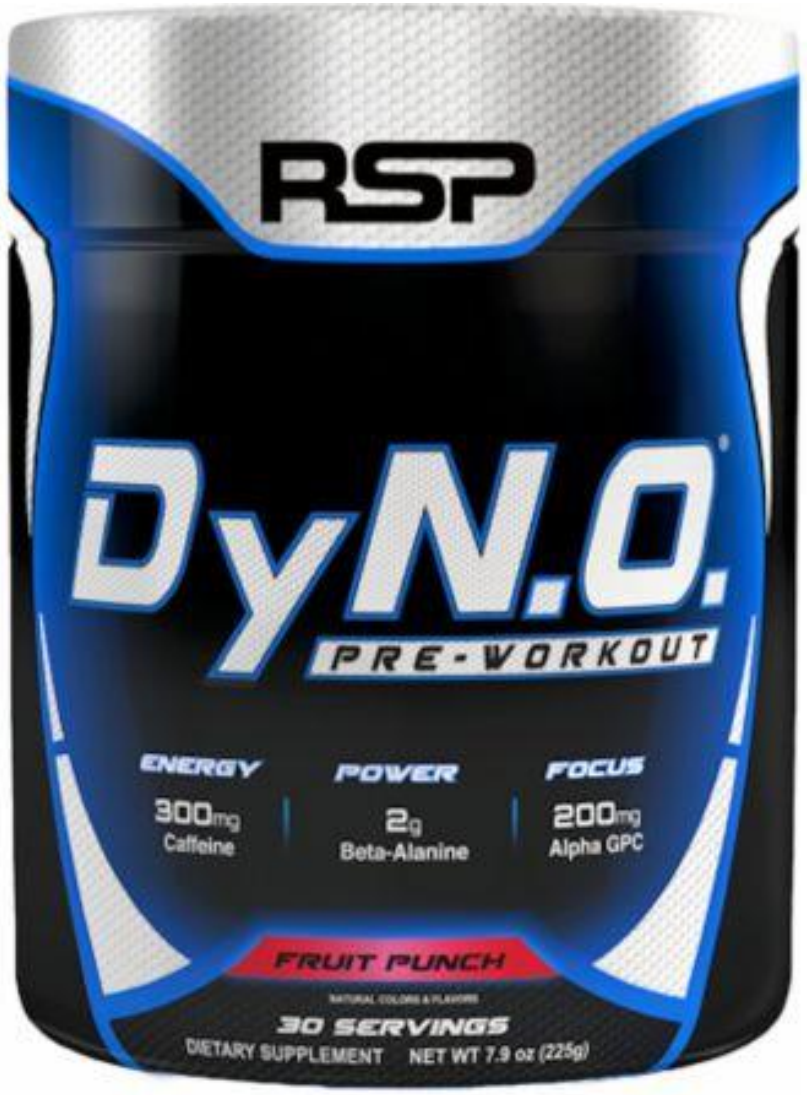
Pre-Workout Supplements

Potential Risk

- Elevated Blood Pressure
- Elevated Heart Rate
- Abnormal Heart Rhythm
- Seizures
- Stroke
- Death

Pre-Workout Supplements

“Banned Substances”



30 Servings	Fruit Punch	
Serving Size: 1 scoop (7.5g)		
Servings Per Container: 30		
Amount Per Serving		**% Daily Value**
Vitamin B3 (as niacin)	20 mg	100%
Magnesium (as magnesium citrate)	21 mg	5%
Sodium (as sodium citrate)	20 mg	1%
Beta Alanine	2,000 mg	**
L-Arginine Alpha Ketoglutarate 1:1	1,000 mg	**
L-Taurine	1,000 mg	**
Choline Bitartrate	1,000 mg	**
Caffeine Anhydrous	300 mg	**
Alpha GPC 50% (Alpha-Glyceryl Phosphoryl [illegible])	200 mg	**
Citrus Aurantium (Bitter Orange)	100 mg	**
[illegible] Pepper Extract (BioPerine®)	5 mg	**

* Percent Daily Values are based on a 2,000 calorie diet. **Daily Value not established.

Other Ingredients:
Natural Flavors, Citric Acid, Sucralose, Beet Root (for color), Silicon Dioxide, Acesulfame Potassium.

Caution: Product contains 300mg of pure Caffeine.

Directions For DyNO: Mix one scoop with 6-10 oz of cold water and consume 15-30 minutes before training. Do not exceed more than one scoop.

Pre-Workout Supplements

“Banned Substances”

20 Servings - Black Cherry Lime

Serving Size 1 Scoop (14.4 g)
Servings Per Container 20

Amount Per Serving	% Daily Value
L-Citrulline Malate (2:1)	6,000 mg †
CarnoSyn® Beta-Alanine	1,600 mg †
Betaine	1,500 mg †
Dendrobium	600 mg †
Theobromine (12%)	300 mg †
Caffeine Anhydrous	200 mg †
Bitter Orange (30% Synephrine)	100 mg †
Theanine	100 mg †
Huperzine	150 mcg †

† Daily Value not established.

Other Ingredients:
Natural And Artificial Flavors, Citric Acid, Acesulfame Potassium, Sucralose, Red Beet Powder, Annatto

Directions For Supernova: Add 1 scoop of SUPERNOVA (14.4 g) to 8 oz - 10 oz/ 250 ml - 300 ml of cold water and stir or shake for a few seconds. Consume 15 minutes before exercise. Begin with 1 serving to assess tolerance before considering increasing the dosage. For best results, combine with a diet and exercise program.

Pre-Workout Supplements

“Banned Substances”

MEN'S PRE-WORKOUT

$74.95

1

Supplement Facts

Serving Size: 1 Scoop (15.95g)
Servings Per Container: 30

Amount Per Serving		%Daily Value
Calories	15	
Total Carbohydrate	3g	1%*
Vitamin C (as ascorbic acid)	120mg	100%
Thiamin (Vitamin B1)	1.5mg	100%
Riboflavin (Vitamin B2)	1.7mg	100%
Niacin (from niacinamide)	20mg	50%
Vitamin B6 (as pyrodixine HCl)	3mg	150%
Vitamin B12 (as methylcobalamin)	200mcg	3,333%
Pantothenic Acid (from d-cal pantothenic acid)	60mg	600%
Chromium (from chromium polyniconate)	400mcg	333%
Sodium (as citrate)	2mg	<1%
Pre-Workout Performance Complex	**10.76g**	**

Sodium D-Aspartic Acid (3.12g), L-Carnitine Complex (2g as tartrate and fumerate), Creatine Nitrate (1g), Agmatine S[illegible] (Agmass®), [illegible]anine (as Carnosyn®), L-Taurine, Choline (as Bitar[illegible]ate), Caffeine Anhydrous, Citrulli[illegible] Malate, Raspberry Ketones, Phenylethlyamine [illegible]Cl, Guarana Seed extract, White [illegible]idney Be[illegible] extract, Opuntia [illegible] extract, [illegible] Tyrosine, [illegible], Glucoronolac[illegible]one, Synepherine [illegible]Cl, Kola Nut extract, Coffee Bean extract, [illegible]etaine Anhydrous, Ginger Root [illegible]

*Percent Daily Values are based on a 2,000 calorie diet.
**Daily Value not established.

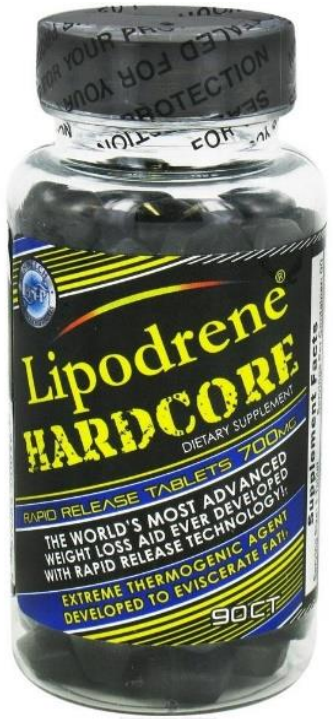
- Large Proprietary Blend
- 5 Stimulants
  - Synephrine (Banned)
  - Guarana (NCAA Banned)
  - Caffeine Anhydrous
  - Coffee Bean Extract
  - Kola Nut Extract

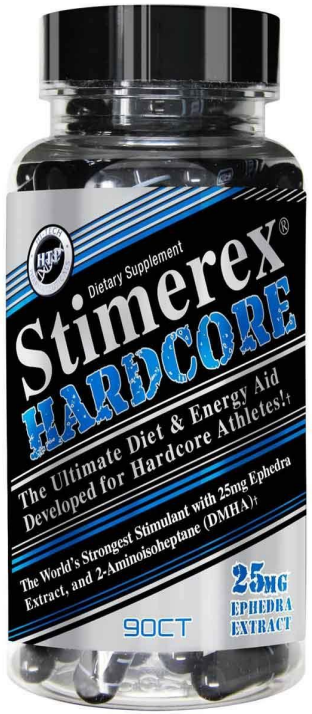
Weight Loss Supplements

- Several 1000 on the market
- Contain the following ingredients:
  - Guarana Seed
  - Bitter Orange
  - DMMA
  - DMBA
  - Octadrine (DMHA)
  - Synephrine

  Multiple Stimulants:
  - May increase core temperature
  - Could increase risk of heat stroke when combined with intense exercise in the heat
  - Studies don’t evaluate hemodynamic markers during a practical experience (2 a day FB practice, Wrestling, etc)

Diet/Weight Loss Supplements





Potential Risk

Elevated Blood Pressure

Elevated Heart Rate

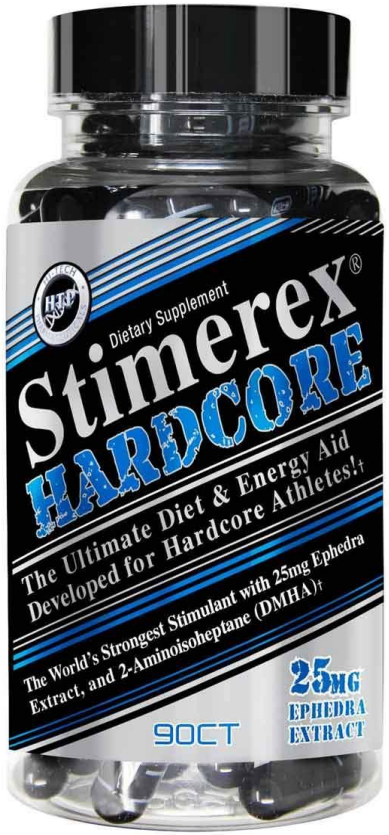
Abnormal Heart Rhythm

Seizures

Stroke

Death

Weight Loss Supplements
“Illegal and Banned Substances”

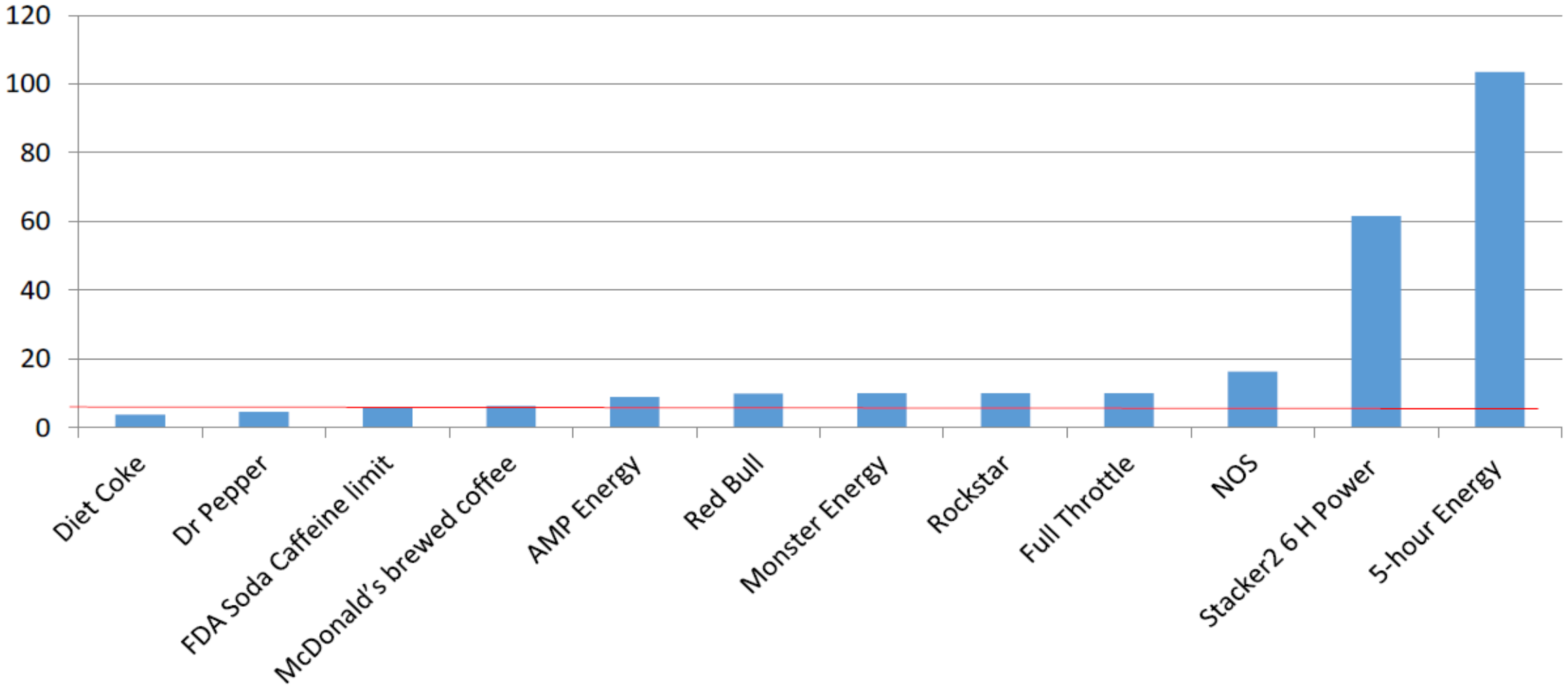


Contains 8 different stimulants and 4 banned substances

Energy Drinks

- Have seen significant increase in usage in HS students
- Will provide a quick boost of energy
- Follow a rapid drop in blood sugar
- Will increase core temperature
- Could increase risk of heat stroke with excessive intake + training in hot environment

DRINK Vs. CAFFEINE CONCENTRATION (mg/fl oz)



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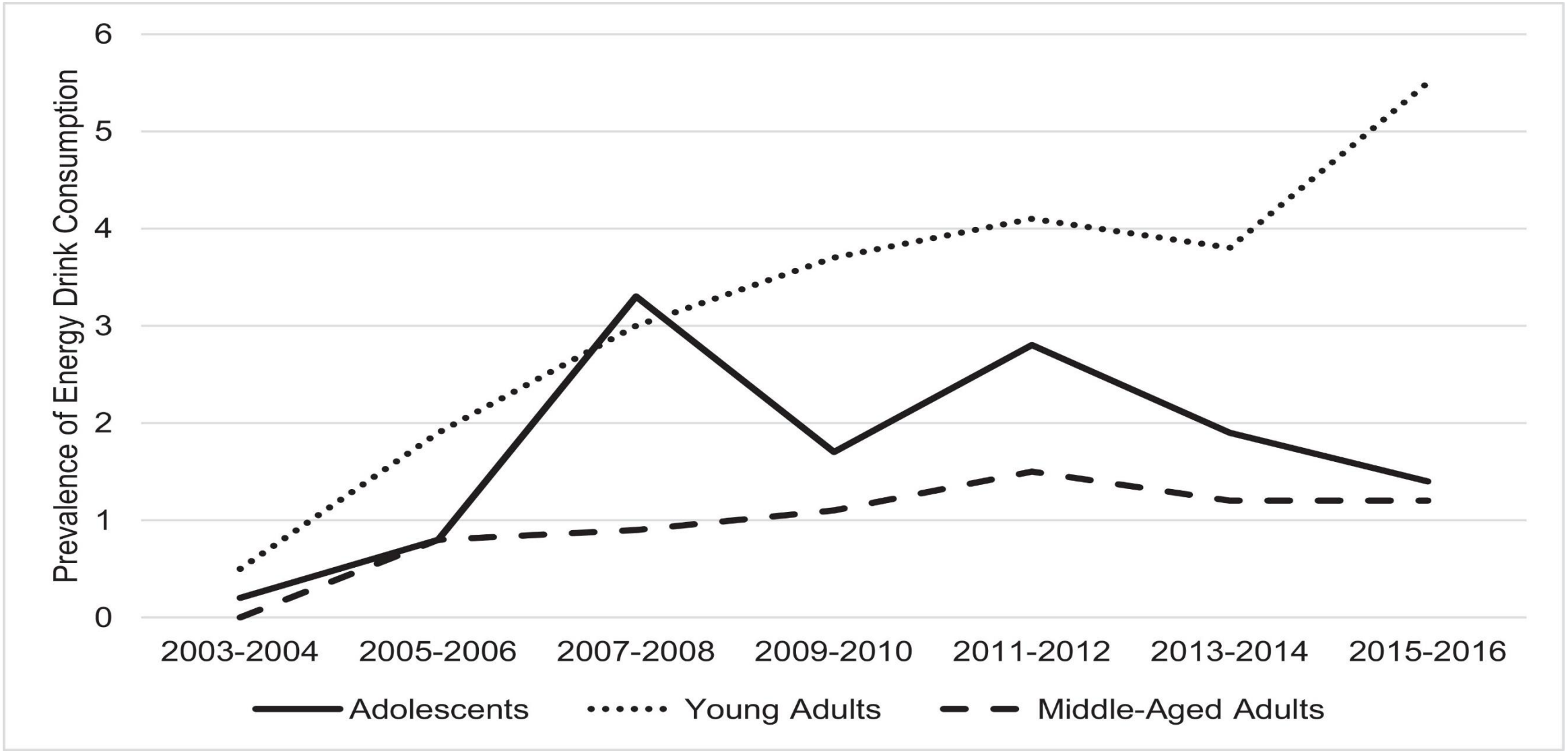
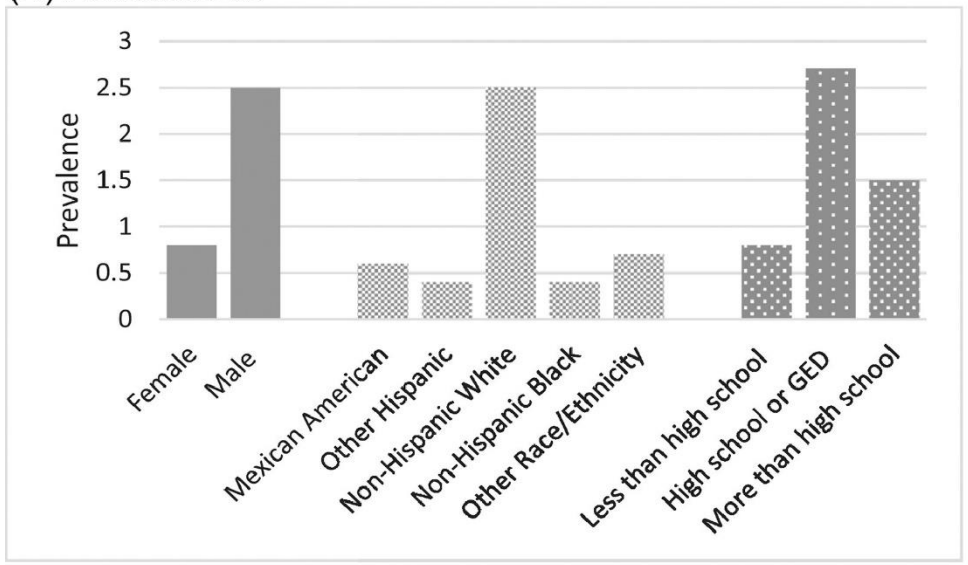
Trends in Energy Drinks



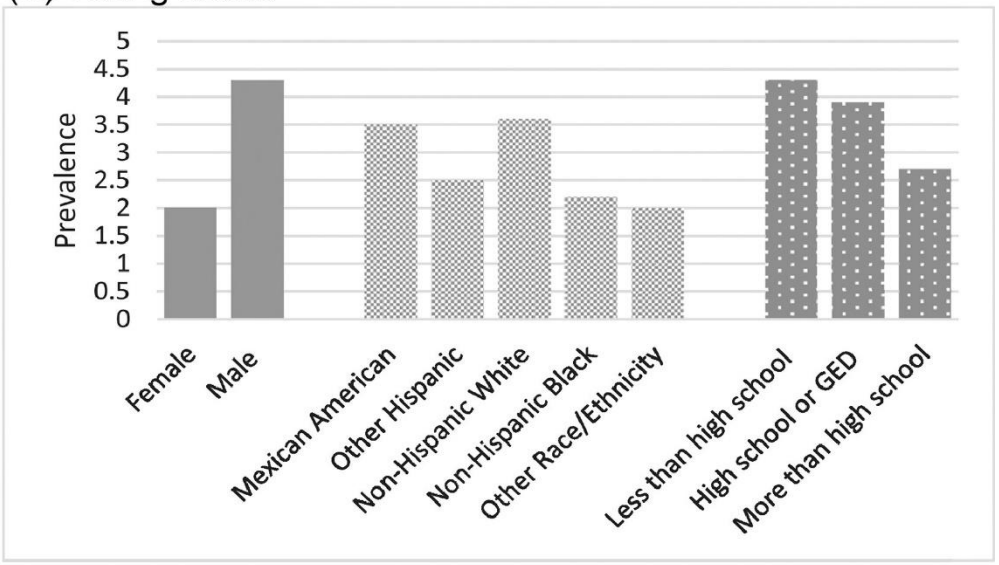
American Journal of Preventive Medicine 2019 56, 827-833DOI: (10.1016/j.amepre.2018.12.007)

Trends in Energy Drinks

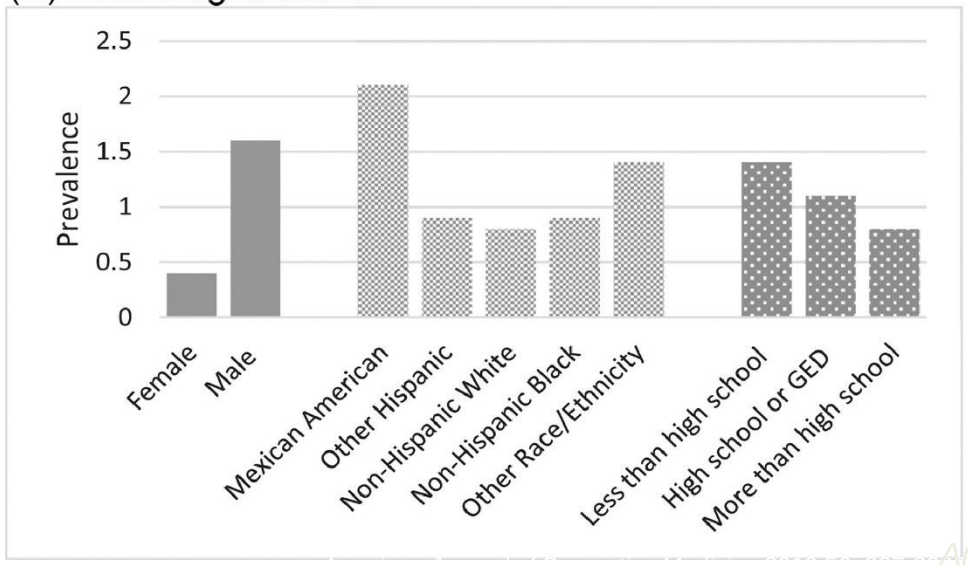
(A) Adolescents



(B) Young adults



(C) Middle-aged adults



- **Highest intake in male Caucasians with a high school diploma or less**

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SEARCH NEWS RELEASES

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American Heart N

Just one energy drink may hurt blood vessel function

American Heart Association Meeting News Brief – Poster Presentation Mo1189 – Session: AT.APS.16

November 05, 2018 | Categories: Heart News, Scientific Conferences & Meetings

Embargoed until 4 a.m. CT/ 5 a.m. ET, Monday, Nov. 5, 2018

DALLAS, Nov. 5, 2018 — Young, healthy adults experienced notably diminished blood vessel function soon after consuming one energy drink, according to preliminary research from a small study to be presented in Chicago at the American Heart Association's Scientific Sessions 2018, a premier global exchange of the latest advances in cardiovascular science for researchers and clinicians.

Energy drink consumption has been associated with many health problems, including conditions associated with the heart, nerves and stomach. Some believe cardiovascular side effects from energy drinks might be related to the drinks' effects on endothelial, or blood vessel, function.

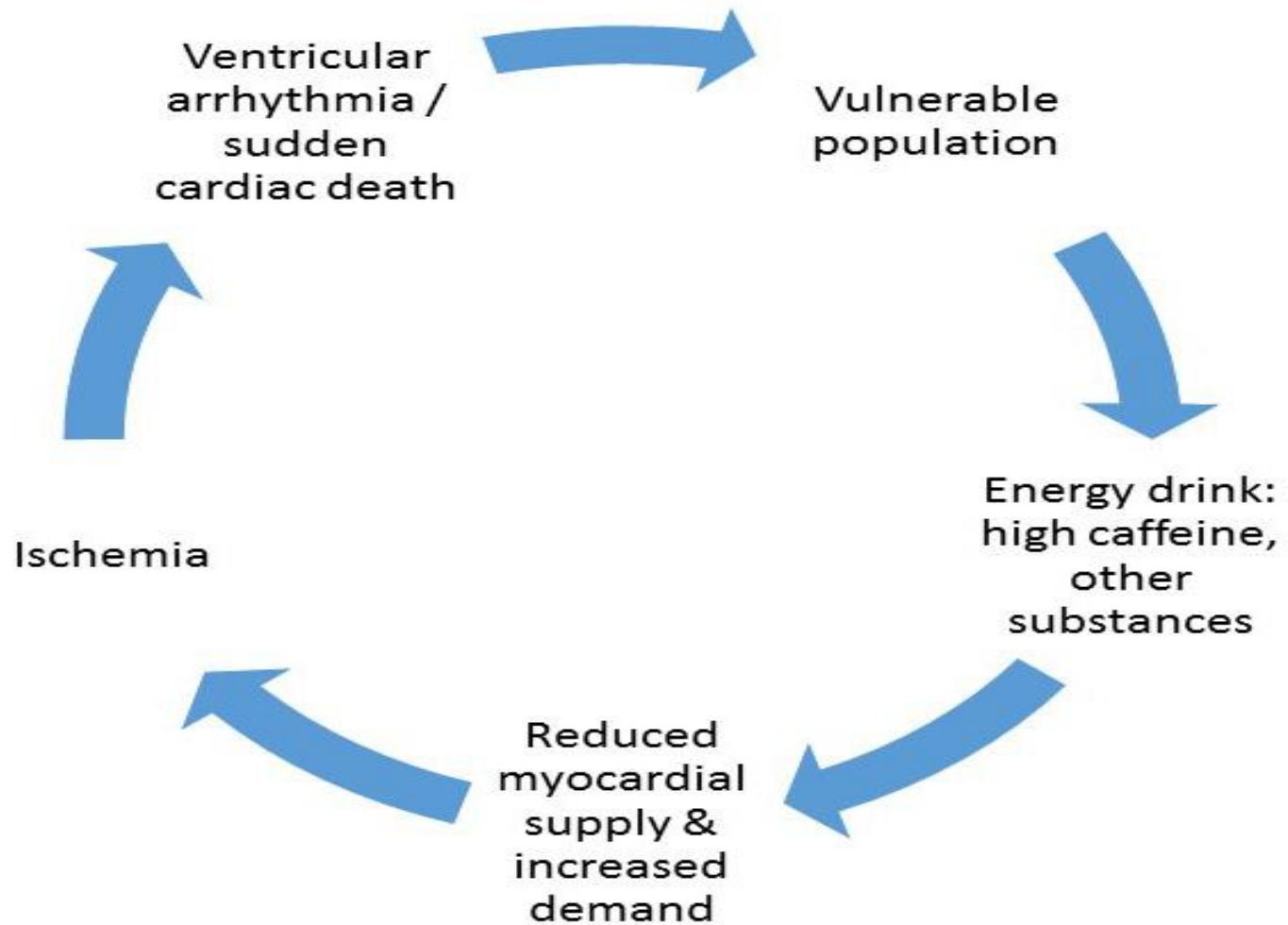
John Higgins, M.D., M.B.A., of McGovern Medical School at UTHealth in Houston and colleagues studied 44 non-smoking, healthy medical students in their 20s by testing their endothelial function before each of the students drank a 24-ounce energy drink. Researchers repeated

RELATED IMAGES

Energy Drinks - overhead

Overhead shot of energy drink cans.

Possible Mechanisms Sudden Cardiac Death associated with Energy Drink Consumption



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Effects of Consuming Energy Drinks

Acute Effects	Potential Chronic Effects
Elevated Blood Pressure	Hypertensive Heart Disease
Increased Heart Rate	Coronary Artery Disease
Increased Corrected QT (QTc) Interval	Atherosclerosis
Supraventricular Arrythmia	Cerebrovascular Disease
Ventricular Arrythmia	Peripheral Arterial Disease
Coronary Artery Spasm	
Coronary Artery Thrombosis	
Takotsubo Cardiomyopathy	
ST-Segment Elevation Myocardial Infarction (STEMI)	
Aortic Dissection	
Postural Orthostatic Tachycardia Syndrome	
Sudden Cardiac Death	
Endothelial Dysfunction	

Higgins J. *Amer Coll Cardiology* 2018

Energy Drinks and Banned Substances

Contains Guarana Seed
Banned by NCAA

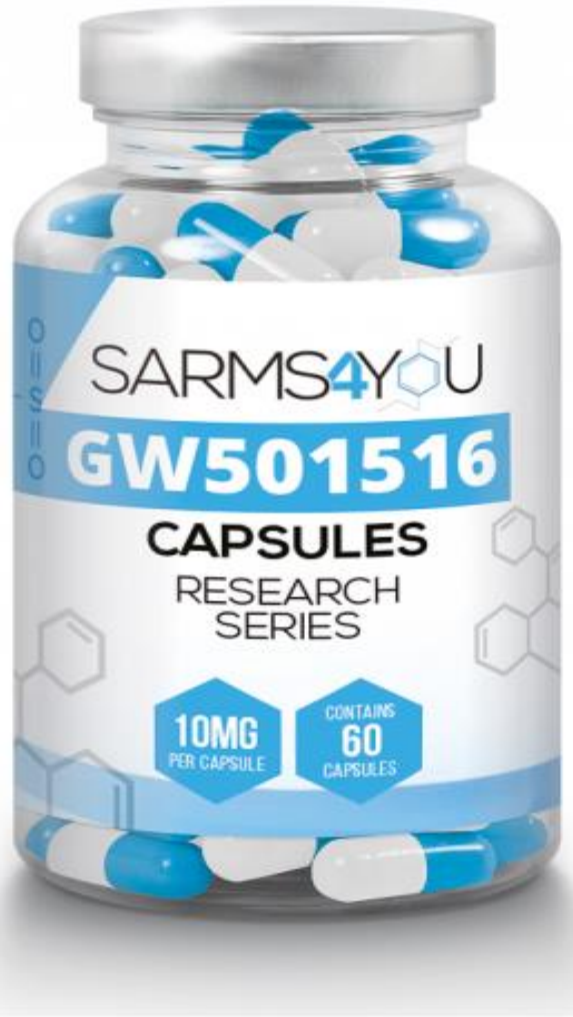
Ingredients: Energy Drinks vs Coffee

- Caffeine
- Guarana Seed (banned by NCAA)
- Synephrine (banned substance)
- Ephedra (banned substance)
- Theobromine
- Theophyline
- Yohimbine or Yohimbe
- Kola Nut

- Caffeine

SARMs


SARMS4YOU
SR-9009
CAPSULES
RESEARCH SERIES
10MG PER CAPSULE
CONTAINS 60 CAPSULES


SARMS4YOU
GW501516
CAPSULES
RESEARCH SERIES
10MG PER CAPSULE
CONTAINS 60 CAPSULES


SARMS4YOU
MK677
CAPSULES
RESEARCH SERIES
10MG PER CAPSULE
CONTAINS 60 CAPSULES

SARMs

- Also known as Selective Androgen Receptors
- Synthetic drugs designed to have similar effects as testosterone
- Androgen receptor ligands – share similar anabolic pathway with steroidal androgens
- Sold in products marketed as dietary supplements
- Illegal in any type of dietary supplement
- Also marketed as “legal steroids” or “steroid alternatives”
- 300 products on the market that contain SARMS
- Interest from Medical Community to conduct research on SARMS
  - May be effective treatment for a variety of health conditions with less side effects than steroids

Types of SARMS

- Andarine (S4)
- Enobosarm (Ostarine, MK-2866)
- Ligandrol (LGD-4033)
- RAD140 (Testolone)
- S-22
- YK11
- Drugs marketed as SARMS but are not
  - Cardarine/GW-501516
  - Ibutamoren/MK-677

Ostarine

- Very popular and commonly used SARM to increase lean body mass
- Not approved for human use and typically obtained through the black market
- Research shown that it has fewer androgenic properties
- Less influence on development and balance of male hormones (including testosterone)
- Currently being studied in patients with Osteoporosis, Cancer, and Hypogonadism
- Prohibited in Sport (under S1 Anabolic Agent)
- Side Effects are unknown in healthy humans
- Not currently available as a prescription medication
- Study in 2013 on cancer patients to assess effects on muscle wasting
  - Demonstrated an improvement in Lean Body Mass
  - No toxic effects associated with androgens
  - Adverse Event was increased tumor progression

Supplements You Don’t Need?

- **Arginine** – Use Beetroot Juice/Powder
  - Arginine blunts GH when combined with RT
- **BCAA’s** – Whey Protein more effective
- **Pre-Workouts** – Drink Coffee
- **HMB** – Falsified studies (take Protein Powder)
- **Extra B-Vitamins** – Eat Carbs for Energy
- **Glutamine** – doesn’t enhance recovery

Dietary Supplements
“Don’t Spend Your Money”

- Agmatine Sulfate
- Betaine
- Creatine Nitrate
- Creatine Hydrochloride
- Creatine Ethyl Ester
- Deer Antler Velvet Spray
- Kre-Alkalyn
- Tribbulus Terresteris

Supplements and Young Athletes

- Do athletes need supplements?
- What is the purpose of a dietary supplement?
- At what point are supplements integrated into an athlete's eating plan?

Supplements and Athletes

- **Do athletes need supplements?**
  - Depends on age, diet, training volume and frequency
- **Purpose of athletes taking supplements?**
  - Correcting micronutrient deficiencies
  - Inflammation and muscle recovery
  - Build strength power
  - Improve immunity and reduce infection risk
  - Delay muscle soreness

Athletes and Dietary Supplements

- **Base Needs (Health and Inflammation)**
  - **Multivitamin**
  - **Omega 3 Fish Oil**
  - **Vitamin D**
  - Cherry Juice
  - Curcumin
- **Strength/Muscle Growth/Performance**
  - Protein
  - Creatine

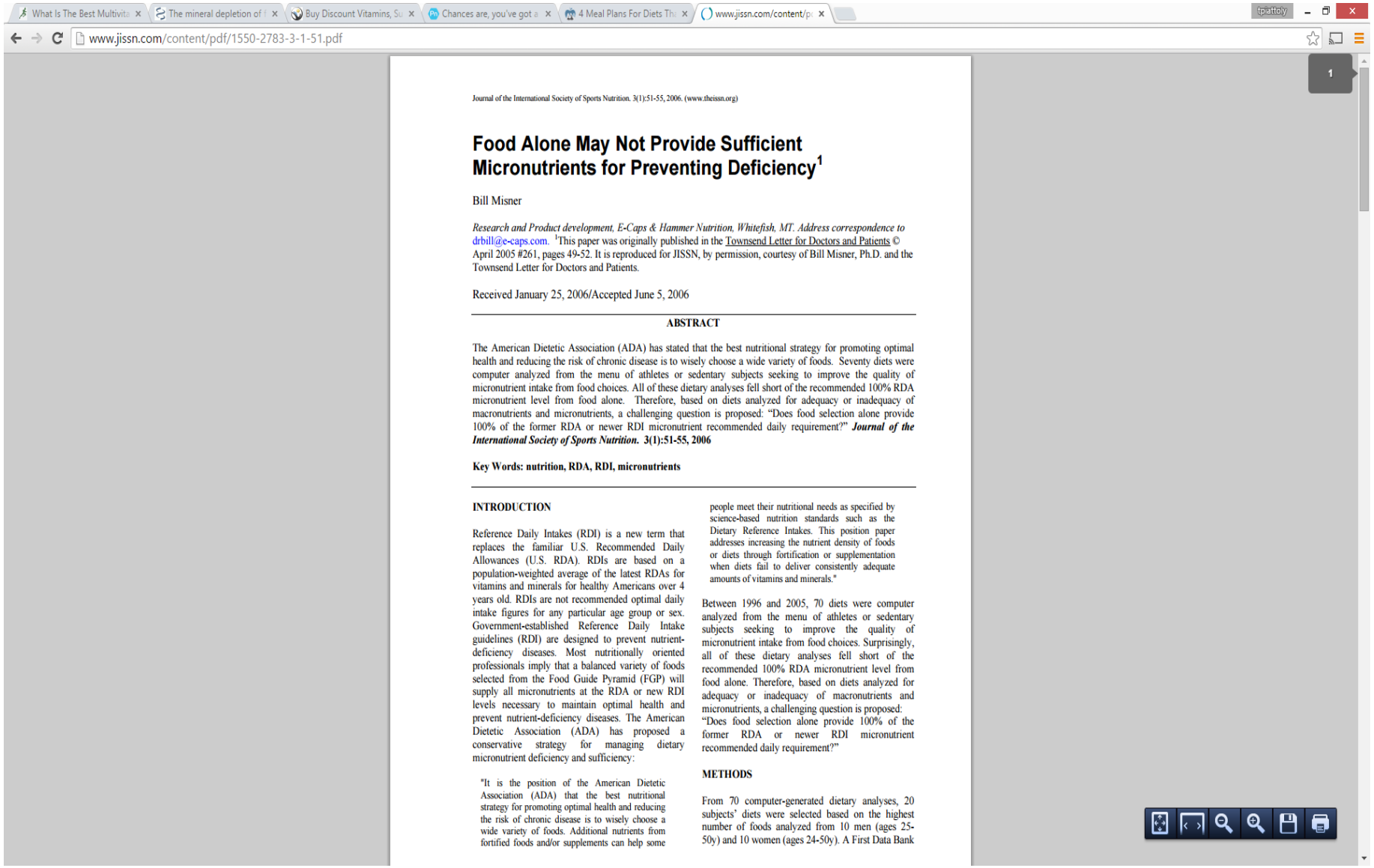
Multivitamin

- **Purpose of a Multivitamin**
  - Provide with a source of nutrients that you may not be getting from your diet
- **Do athletes need a multivitamins?**
  - Yes because our diets are insufficient in micronutrients
  - Look at a multivitamin as an insurance policy if the diet is insufficient in fruits, veggies, whole grains, and quality protein
- **Will taking a multivitamin impact performance?**
  - Let’s find out

Multivitamin

- **Why a Multivitamin is an important piece of an athletes supplement protocol?**
  - A lot of our produce today is stripped of its true nutrient value to maximize sugar, specifically fructose.
  - The ***Journal of Nutrition and Health*** found copper levels have dropped 90% in dairy, 76% in veggies, and 55% in meat products (***Thomas D, Nutr Health 2007***)
  - Grain fed meats are lower in antioxidants, Omega 3, micronutrients, fatty acids, vitamins and minerals than Organic Grass fed meat

Multivitamin



www.jissn.com/content/pdf/1550-2783-3-1-51.pdf

Journal of the International Society of Sports Nutrition. 3(1):51-55, 2006. (www.theissn.org)

Food Alone May Not Provide Sufficient Micronutrients for Preventing Deficiency[1]

Bill Misner

Research and Product development, E-Caps & Hammer Nutrition, Whitefish, MT. Address correspondence to drbill@e-caps.com. [1]This paper was originally published in the Townsend Letter for Doctors and Patients © April 2005 #261, pages 49-52. It is reproduced for JISSN, by permission, courtesy of Bill Misner, Ph.D. and the Townsend Letter for Doctors and Patients.

Received January 25, 2006/Accepted June 5, 2006

ABSTRACT

The American Dietetic Association (ADA) has stated that the best nutritional strategy for promoting optimal health and reducing the risk of chronic disease is to wisely choose a wide variety of foods. Seventy diets were computer analyzed from the menu of athletes or sedentary subjects seeking to improve the quality of micronutrient intake from food choices. All of these dietary analyses fell short of the recommended 100% RDA micronutrient level from food alone. Therefore, based on diets analyzed for adequacy or inadequacy of macronutrients and micronutrients, a challenging question is proposed: "Does food selection alone provide 100% of the former RDA or newer RDI micronutrient recommended daily requirement?" ***Journal of the International Society of Sports Nutrition.*** **3(1):51-55, 2006**

Key Words: nutrition, RDA, RDI, micronutrients

INTRODUCTION

Reference Daily Intakes (RDI) is a new term that replaces the familiar U.S. Recommended Daily Allowances (U.S. RDA). RDIs are based on a population-weighted average of the latest RDAs for vitamins and minerals for healthy Americans over 4 years old. RDIs are not recommended optimal daily intake figures for any particular age group or sex. Government-established Reference Daily Intake guidelines (RDI) are designed to prevent nutrient-deficiency diseases. Most nutritionally oriented professionals imply that a balanced variety of foods selected from the Food Guide Pyramid (FGP) will supply all micronutrients at the RDA or new RDI levels necessary to maintain optimal health and prevent nutrient-deficiency diseases. The American Dietetic Association (ADA) has proposed a conservative strategy for managing dietary micronutrient deficiency and sufficiency:

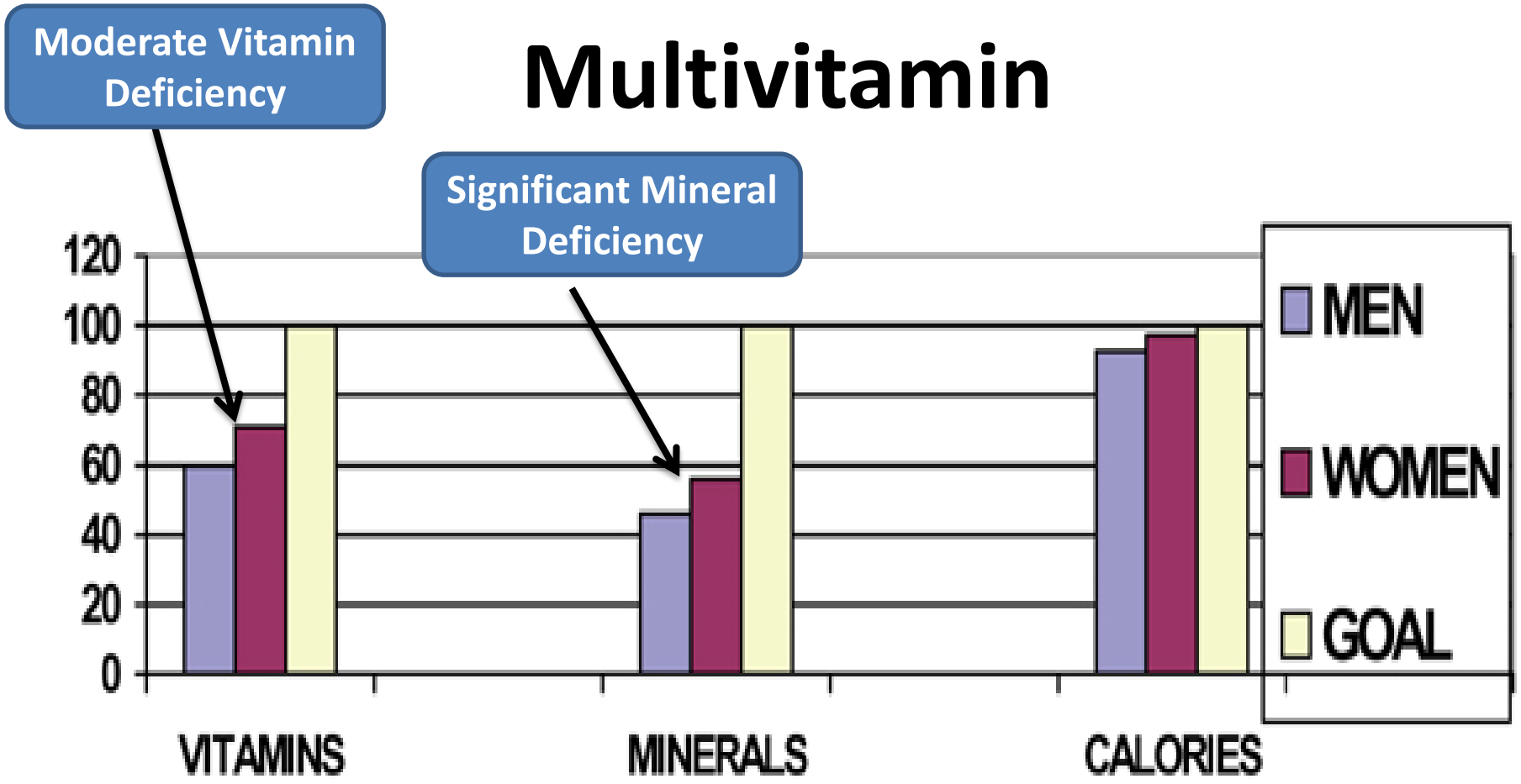
> "It is the position of the American Dietetic Association (ADA) that the best nutritional strategy for promoting optimal health and reducing the risk of chronic disease is to wisely choose a wide variety of foods. Additional nutrients from fortified foods and/or supplements can help some people meet their nutritional needs as specified by science-based nutrition standards such as the Dietary Reference Intakes. This position paper addresses increasing the nutrient density of foods or diets through fortification or supplementation when diets fail to deliver consistently adequate amounts of vitamins and minerals."

Between 1996 and 2005, 70 diets were computer analyzed from the menu of athletes or sedentary subjects seeking to improve the quality of micronutrient intake from food choices. Surprisingly, all of these dietary analyses fell short of the recommended 100% RDA micronutrient level from food alone. Therefore, based on diets analyzed for adequacy or inadequacy of macronutrients and micronutrients, a challenging question is proposed: "Does food selection alone provide 100% of the former RDA or newer RDI micronutrient recommended daily requirement?"

METHODS

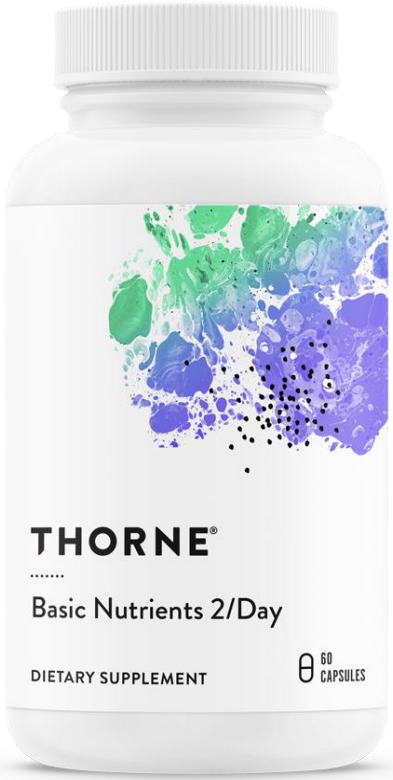
From 70 computer-generated dietary analyses, 20 subjects' diets were selected based on the highest number of foods analyzed from 10 men (ages 25-50y) and 10 women (ages 24-50y). A First Data Bank

Multivitamin



Micronutrient Deficiency from Diets in 10 Men & 10 Women
Misner B, ***Journal of the International Society of Sports Nutrition*** 2006 **3**:51-55

Multivitamin



- NSF for Sport Tested
- Free of banned substances
- Uses Amino Acid Chelated minerals

Omega 3 Supplementation

What are Omega 3 Fatty Acids?

- **Omega 3 Fats**
  - PUFAS
  - Essential Fatty Acids we need to consume from the diet
- **Eicosapentaenoic Acid (EPA)**
  - Found in Oily Fish, Algae, and Krill
  - Need it in high quantities to receive benefits
- **Docosahexaenoic Acid (DHA)**
  - Found in Oily Fish, Algae, and Krill
  - Body converts some DHA back to EPA to keep levels equal
- **ALA**
  - Plant based found in leafy veggies, flaxseeds, chia, canola, walnut, soybean oils
  - Short chain omega 3 which body has to convert into EPA and DHA
  - Only 1% is converted so it’s an inefficient way to get Omega 3

Food Sources of Omega 3

Food Type	Omega 3s (mg)
Mackeral (3.5 oz)	5134
Fish Oil (1 tsp)	3000
Cod Liver Oil (1 tbsp.)	2664
Salmon (3.5 oz)	2260
Anchovies	2113
Herring (3.5 oz)	1729
Sardines	1480
Caviar (1 tbsp.)	1086
Flaxseeds (1 tbsp.)	2338 (seeds) 7196 (oil)
Chia Seeds (1 oz)	4915
Walnuts (1 oz)	2542
Soybeans (1/2 cup)	1241

Omega 3 (i.e. Fish Oil)

- Very beneficial for health when Omega 3:Omega 6 ratio is 1:1
- Average US diet is around 20:1 (Omega 6:Omega 3)
- Ratio of 1:1 is associated with healthy blood vessels, lower lipid count and reduced risk for plaque buildup
- Also used to lower triglycerides

Benefits of Omega 3's for Athletes

- **Body Fat**
- **Lean Muscle Preservation**
- CV Protection
- Cognitive Function
- ADHD/Autism
- **Inflammation/Pain/Recovery**
- **Concussion/TBI**
- Depression
  - Post-Career Option

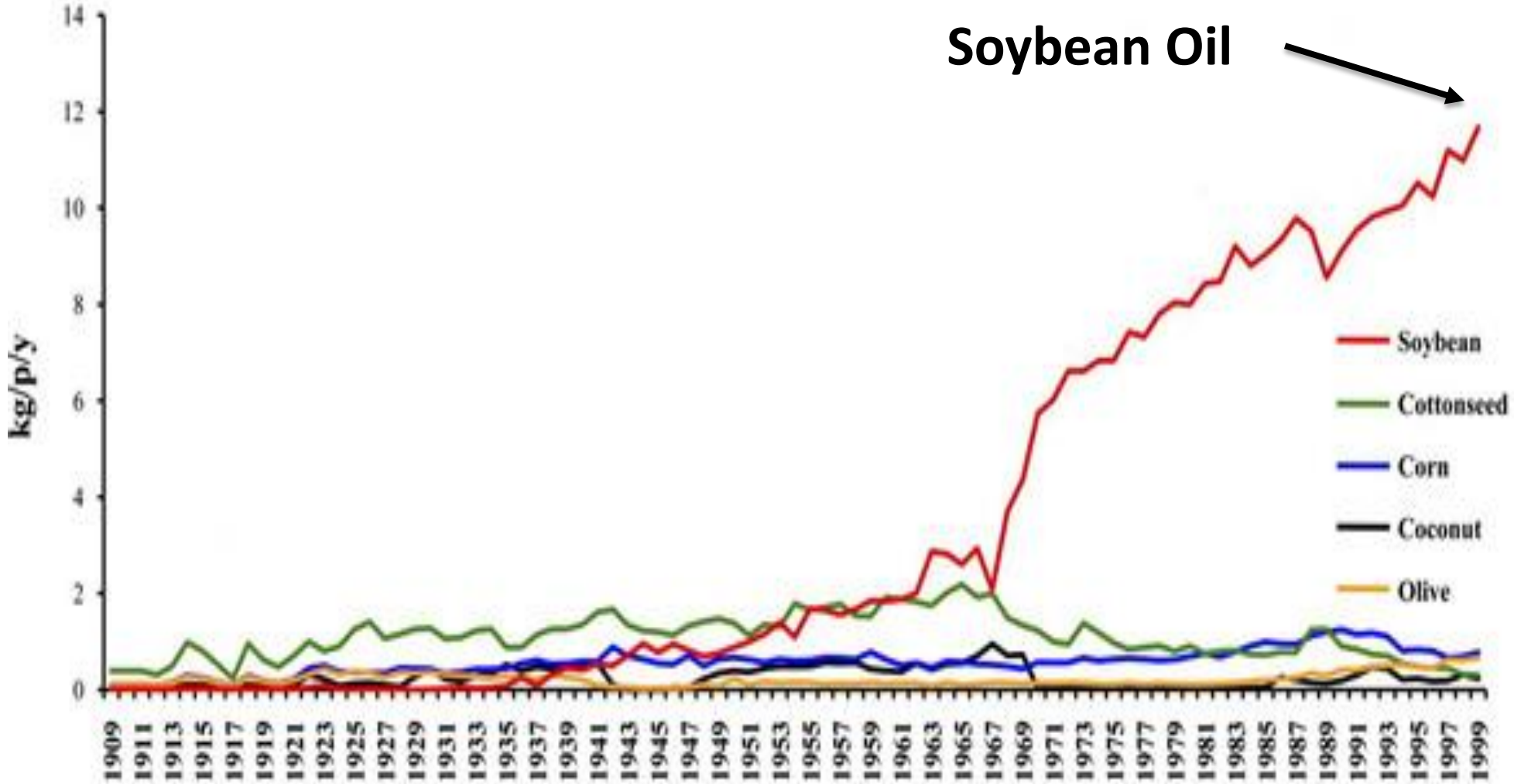
What are Omega 6 Fatty Acids?

- **Omega 6 Fats**
  - PUFAS
  - Essential Fatty Acid we need to consume from the diet
- **Linoleic Acid**
  - Converts to GLA and breaks down into Arachidonic Acid
  - *Soybean, Corn, Safflower, Sunflower, Peanut, and Cottonseed Oils*
- **Arachidonic Acid**
  - Peanut Oil, Meat, Eggs, Dairy Products
- **Gamma Linoleic Acid (GLA)**
  - Hemp seeds, Spirulina, Evening Primrose Oil, Borage, Black Currant Seed

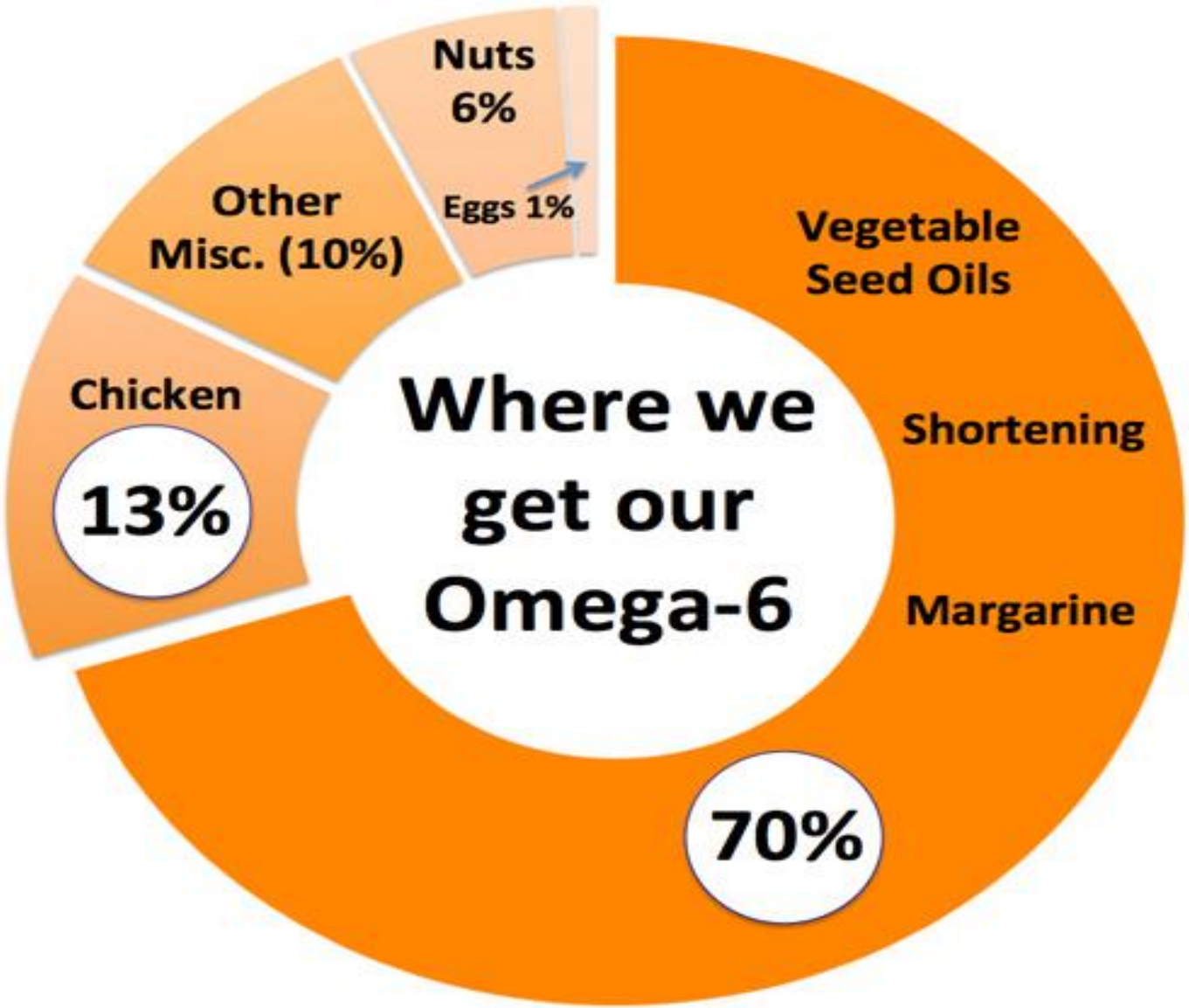
Are there benefits to Omega 6?

- **When consumed in the right balance:**
  - Reduces nerve pain
  - Fights Inflammation
  - Improves Arthritis
  - Improves ADHD Symptoms
  - Reduces High Blood Pressure
  - May reduce risk for Heart Disease
  - Improves Bone Health

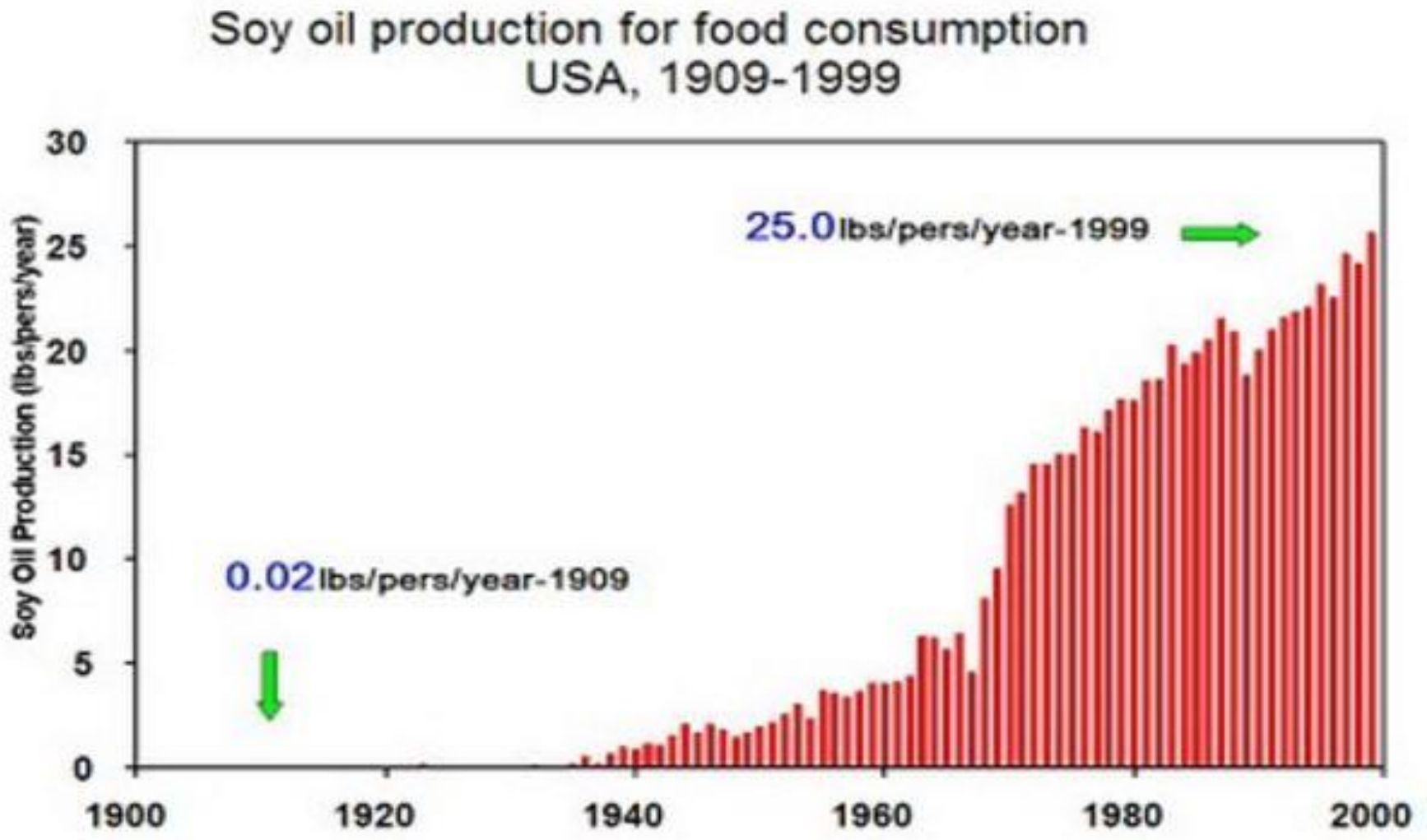
The Omega-6 Problem



Omega 6 Fats


Nuts
6%
Eggs 1%
Other
Misc. (10%)
Chicken
13%
Where we
get our
Omega-6
Vegetable
Seed Oils
Shortening
Margarine
70%

The Omega-6 Problem



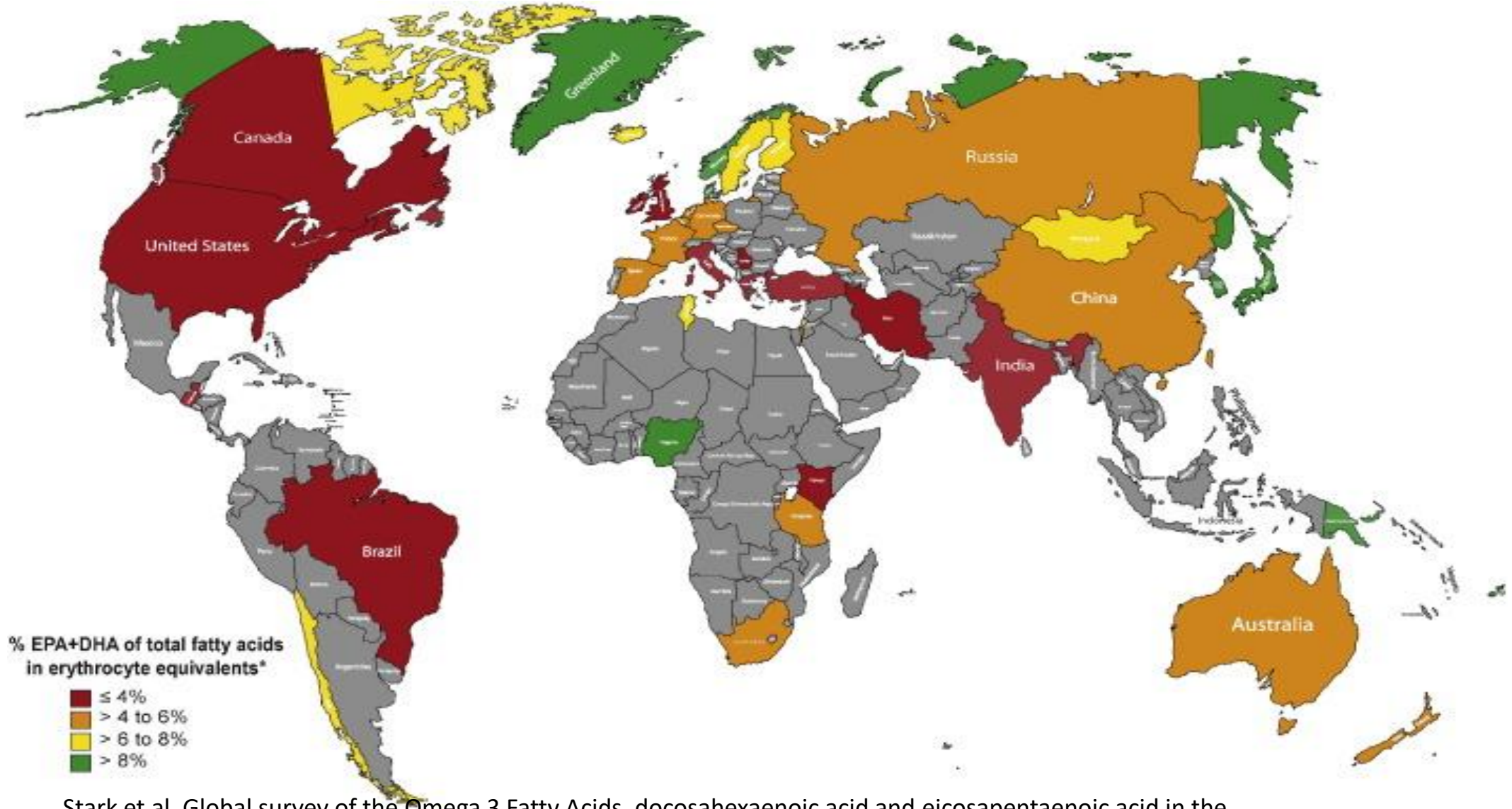
Omega 6 Rich Foods

- Western diet has an abundance of Omega 6 rich foods
- **Pro-Inflammatory as diet is around 20:1 Omega 6:Omega 3**
- Biggest Culprits are Vegetable Oils (Safflower) & Soybean Oil
  - Fried foods
  - Regular Mayo
  - Potato Chips
  - Salad Dressings
  - Baked goods
  - Processed Foods
  - Fast Food

Testing Omega 3

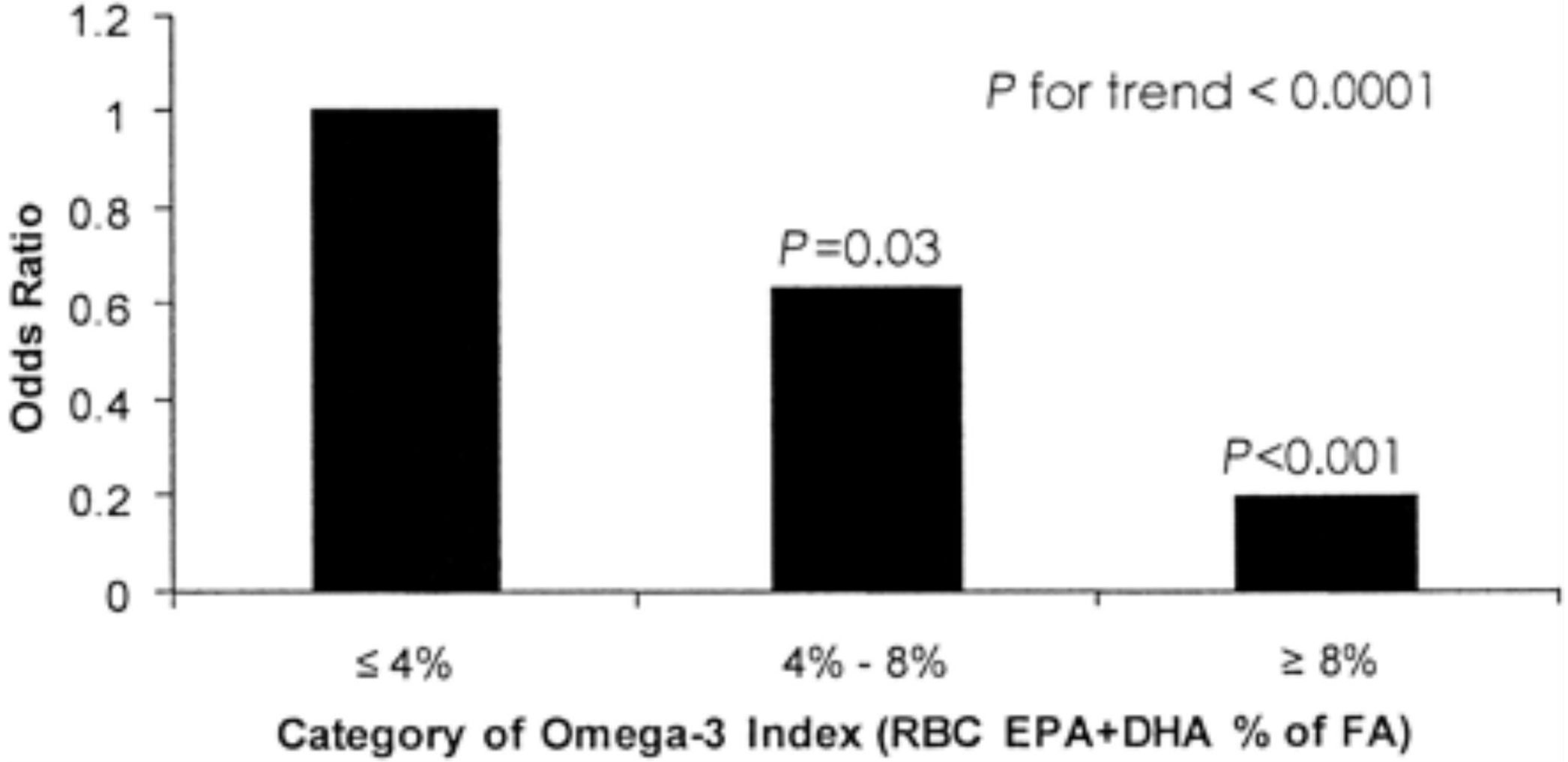
- **Omega 3 Index Test**
  - Simple blood marker to assess Omega 3 in blood
  - Sum of EPA + DHA in the erythrocyte membranes
  - Rarely tested by physicians to assess CVD risk
  - Good predictor of CVD/CHD risk
- **Levels of Risk based on Score**
  - **High risk:** <4%
  - **Intermediate Risk:** 4-8%
  - **Low Risk:** > 8%

Global view of Omega 3 Index



Stark et al. Global survey of the Omega 3 Fatty Acids, docosahexaenoic acid and eicosapentaenoic acid in the blood stream of healthy adults. (2016). *Progress in Lipid Research; (63), 132-152.*

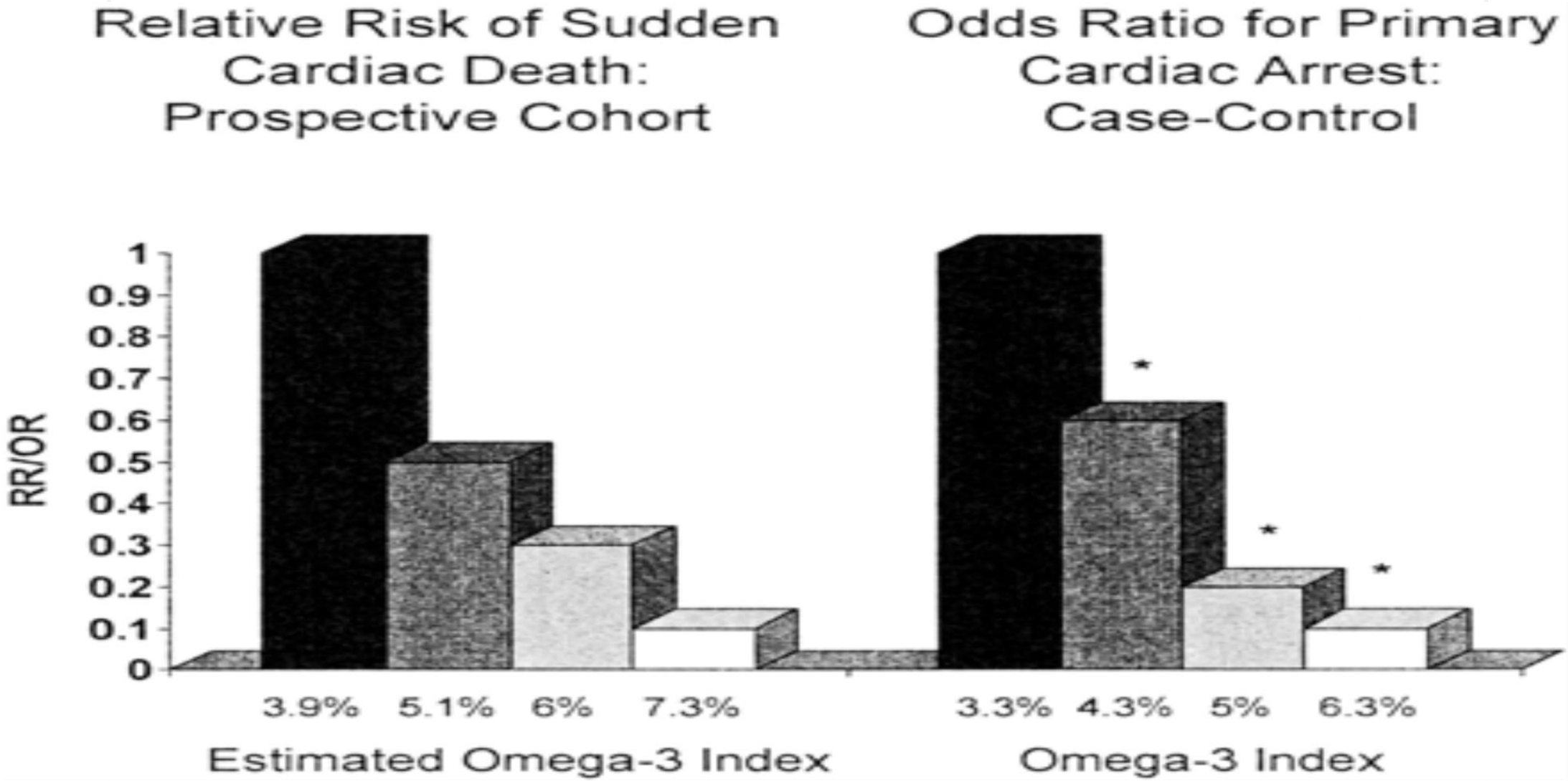
Omega 3 Index and CHD Risk



From: The omega-3 index as a risk factor for coronary heart disease

Am J Clin Nutr. 2008;87(6):1997S-2002S. doi:10.1093/ajcn/87.6.1997S

Omega 3 Index and CHD Risk



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Journal of Athletic Training 2019;54(1):7–11
doi: 10.4085/1062-6050-387-18

www.natajournals.org

The Omega-3 Index in National Collegiate Athletic Association Division I Collegiate Football Athletes

Anthony Anzalone, MS*; Aaron Carbuhn, PhD, RD†; Lauren Jones, MS, RD, CSSD‡; Ally Gallop, MS, RD, CSSD‡; Alex Smith, MS, RD‡; Palmer Johnson, MS, RD§; Lisa Swearingen, MS, RD||; Craig Moore, RD, CSSD‡; Ernest Rimer, PhD‡; Joe McBeth, MS, ATC‡; William Harris, PhD¶#; K. Michelle Kirk, MD††; David Gable, MS, ATC, LAT**; Andrew Askow, BS*; Will Jennings, BS*; Jonathan M. Oliver, PhD***

*The Sport Science Center at Texas Christian University, Fort Worth; †Department of Dietetics and Nutrition, University of Kansas Medical Center, Kansas City; ‡University of Utah Athletics, Salt Lake City; §University of Missouri Athletics, Columbia; ||University of South Carolina Athletics, Columbia; ¶Department of Internal Medicine, Sanford School of Medicine, University of South Dakota, Vermillion; #OmegaQuant, LLC, Sioux Falls, SD; **Athletics and ††JPS Sports Medicine Fellowship, Texas Christian University, Fort Worth

Context: The essential omega-3 fatty acids (ω-3 FAs) eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) exhibit vital biological roles and are critical for cardiovascular and neurologic health. Compared with the general population, football athletes may be at an increased risk of cardiovascular disease. Further, those same athletes are also exposed to repetitive head impacts, which may lead to long-term neurologic deficits. Both diets high in ω-3 FAs and supplementation with ω-3 FAs have been reported to reduce the risk of cardiovascular disease, and early evidence suggests a potential neuroprotective effect of supplementation.

Objective: To determine the (1) erythrocyte content of DHA and EPA, as measured by the Omega-3 Index, expressed as a percentage of total fatty acids, in National Collegiate Athletic Association Division I football athletes and (2) distribution across the Omega-3 Index risk zones established for cardiovascular disease: high risk, <4%; intermediate risk, 4% to 8%; and low risk, >8%.

Design: Cross-sectional descriptive study.

Setting: Multicenter trial.

Patients or Other Participants: Deidentified data including complete erythrocyte fatty acid profile from the 2017–2018 season, age at time of testing, height, weight, and ethnicity were collected from 404 athletes.

Main Outcome Measure(s): Omega-3 Index.

Results: About 34% of athletes (n = 138) had an Omega-3 Index considered high risk (<4%), and 66% (n = 266) had a risk considered intermediate (4%–8%). None had a low-risk Omega-3 Index.

Conclusions: The Omega-3 Index is a simple, minimally invasive test of ω-3 FA status. Our data indicate that football athletes may be deficient in the ω-3 FAs DHA and EPA. The fact that no athlete had an Omega-3 Index associated with low risk suggests football athletes may be at increased risk for cardiovascular disease in later life.

Key Words: eicosapentaenoic acid, docosahexaenoic acid, cardiovascular disease risk, head impacts, concussion

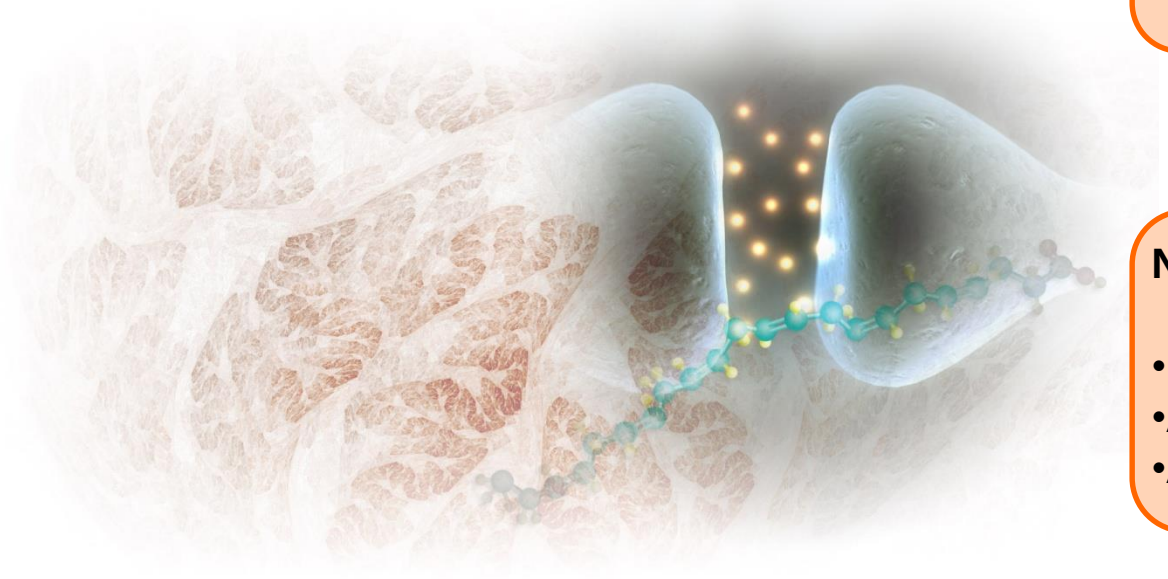
- 404 Division 1 Football Players
- Assess Omega 3 Index
- High Risk (<4%) – 34% of Athletes
- Moderate Risk (4-8%) – 66% of Athletes
- Low Risk – no athletes

Neuroprotective Effects of DHA

Release of DHA From Cell Membrane by Phospholipase A2

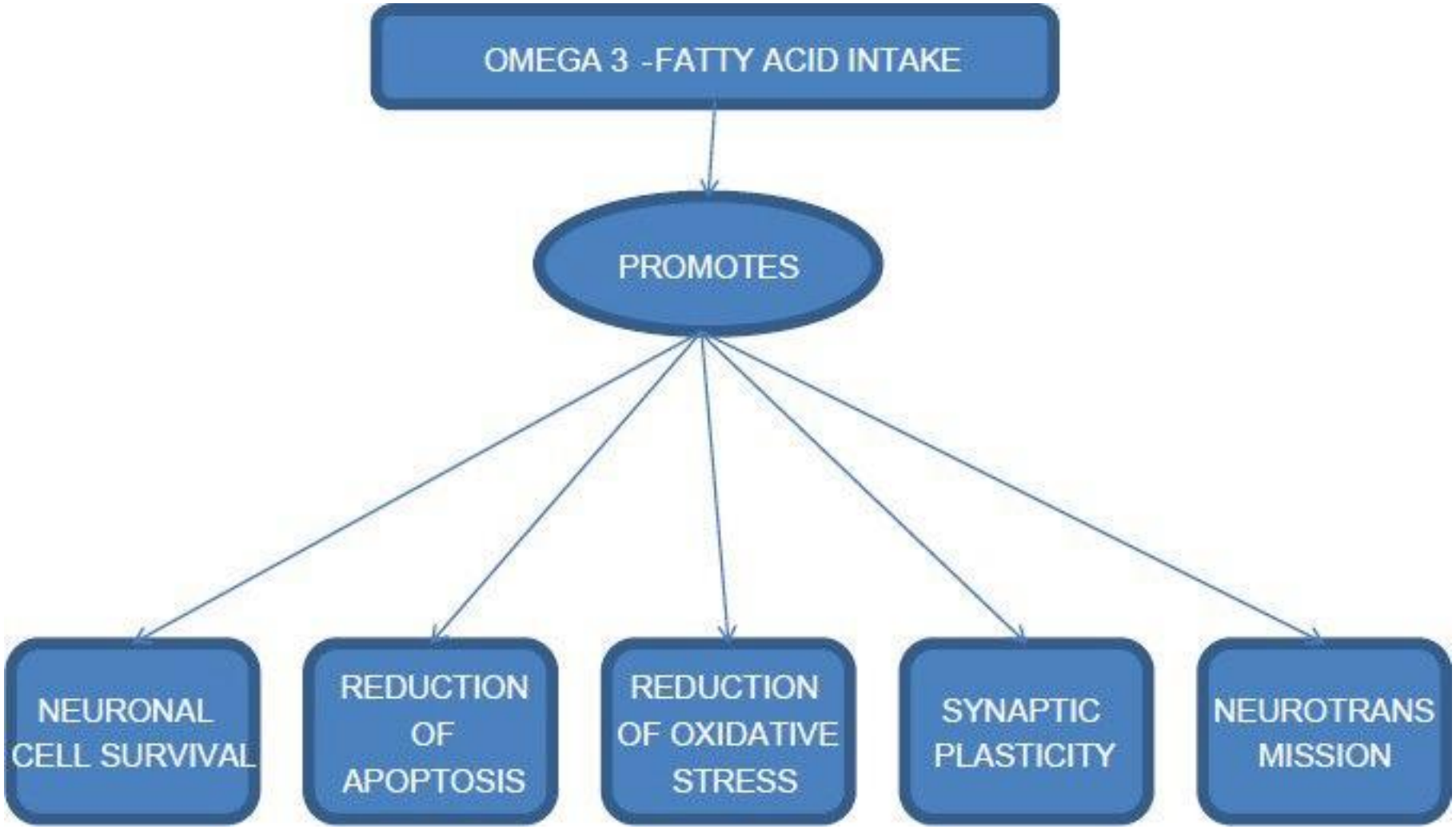
DHA

Resolvins
Lipoxins
15-Lipoxygenase (15-LOX) activation



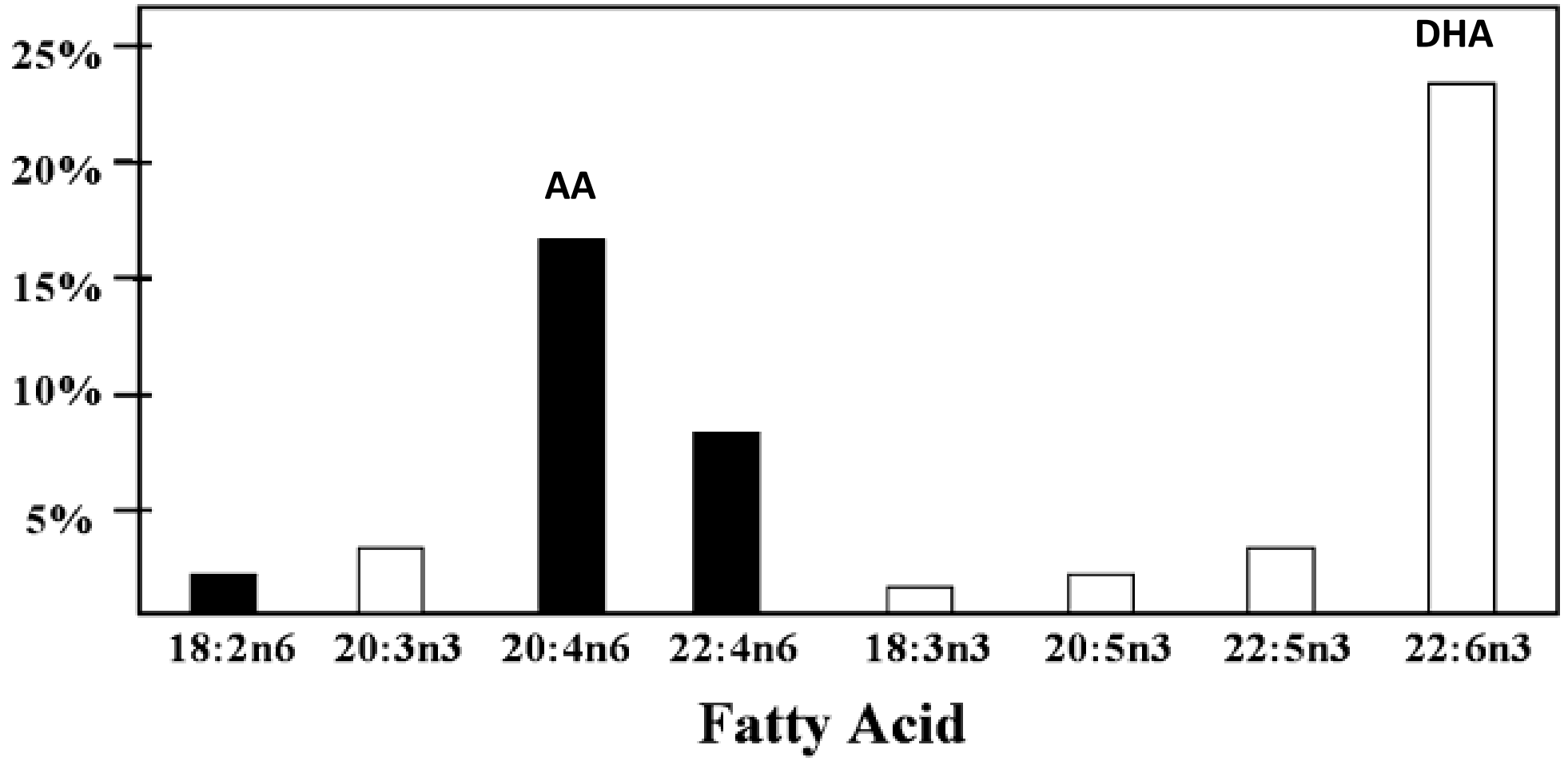
Neuroprotectin-D1
(10,17S-docosatriene)
- Neuroprotective
- Anti-apoptotic
- Anti-inflammatory

Neuroprotective Effects of Omega 3



Kumar et al. (2014). Omega-3 Fatty Acids Could Alleviate the Risks of Traumatic Brain Injury – A Mini Review. *J Tradi Complement Med*. Apr-Jun; 4(2): 89–92.

Fatty Acid Composition of the Brain



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2. Leonard WR, Robertson ML. Evolutionary perspective on human nutrition: the influence of brain and body size on diet and metabolism. Am J Hum Biol 1994; 6: 77–88.

Omega-3 in Early Child Development

- Mothers who ate fish four times a week during pregnancy had babies with higher developmental scores at 18 months compared with those who ate no fish
- Children whose mothers received 1.18 g DHA and 0.8 g EPA per day at 4 years of age showed significantly higher IQ tests

Daniels,et al, Fish Intake During Pregnancy and Early Cognitive Development of Offspring. *Epidemiology* 2004;15: 394–402)

Helland, I.B., Smith, L., Saarem, K., Saugstad, O.D. & Drevon, C.A. (2003) Maternal supplementation with very-long-chain n-3 fatty acids during pregnancy and lactation augments children's IQ at 4 years of age. *Pediatrics* 111, 39–44.

Omega-3 and Autism

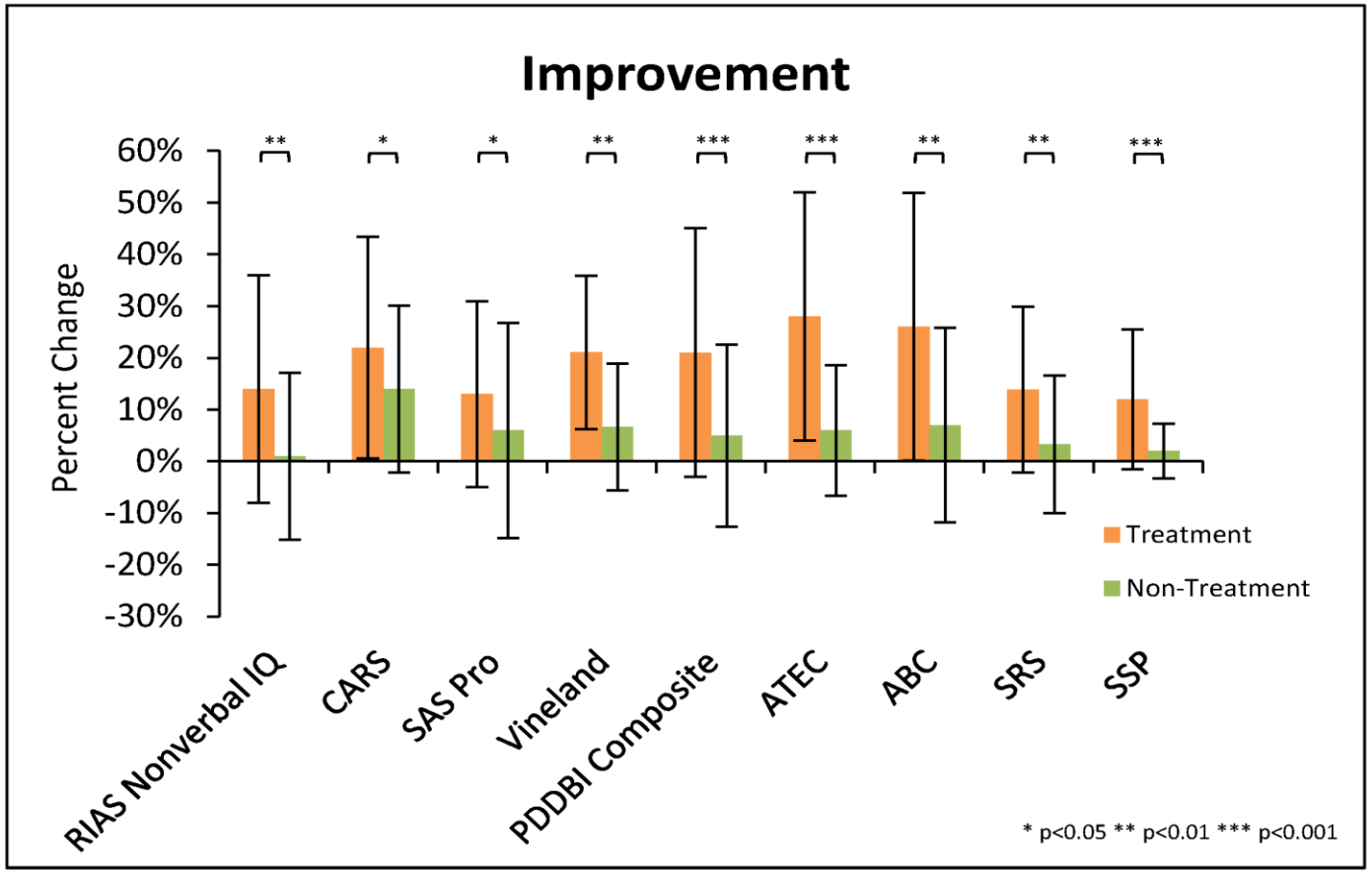
- 12 Month Randomized Controlled Trial with Children and Adults with Autism Spectrum Disorder (ASD) who received a multi-nutrient supplement + EPA and DHA starting at day 60.
- **Treat Dose dependent on size**
  - 30-50 lbs: 2 caps/d (850 mg EPA/220 mg DHA)
  - 51-100 lbs: 3 caps/d (1275 mg EPA/330 mg DHA)
  - 100+ lbs: 4 caps/d (1700 mg EPA/440 mg DHA)

Adams,et al, Comprehensive Nutritional and Dietary Intervention for Autism Spectrum Disorder – A Randomized Controlled 12 Month Trial. *Nutrients* 2018;10(3): 394–402)

Omega-3 and Autism

Measurements of:

- Performance
- Autism Symptoms
- Functionality
- Behavior
- Social Response



Adams,et al, Comprehensive Nutritional and Dietary Intervention for Autism Spectrum Disorder – A Randomized Controlled 12 Month Trial. *Nutrients* 2018;10(3): 394–402)

Omega-3 and ADD/ADHD

- Systematic review of 16 RCT which included 1,514 children and young people (up to 18 years) with ADHD
- Subjects had ADHD at baseline
- Had to be taking Omega 3 supplement with EPA, DHA, and GLA
- 4 studies used a ratio of 9:3:1 (EPA:DHA:GLA)
- **Results**
  - 13/16 studies demonstrated favorable benefits on ADHD symptoms
  - Omega 3 lowered to dose of traditional medicine and proved to be an effective adjunct therapy

Derbyshire E. Do Omega-3/6 Fatty Acids Have a Therapeutic Role in Children and Young People with ADHD? *J Lipids 2017;6285218.*

Omega-3 and ADD/ADHD

- **Omega 3 supplementation demonstrated improvements in:**
  - Hyperactivity
  - Impulsivity
  - Attention
  - Visual learning
  - Word reading
  - Working/Short-term memory

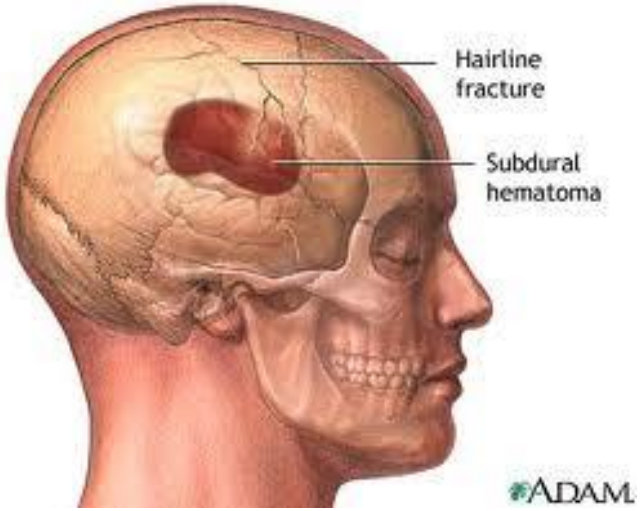
Derbyshire E. Do Omega-3/6 Fatty Acids Have a Therapeutic Role in Children and Young People with ADHD? *J Lipids 2017;6285218.*

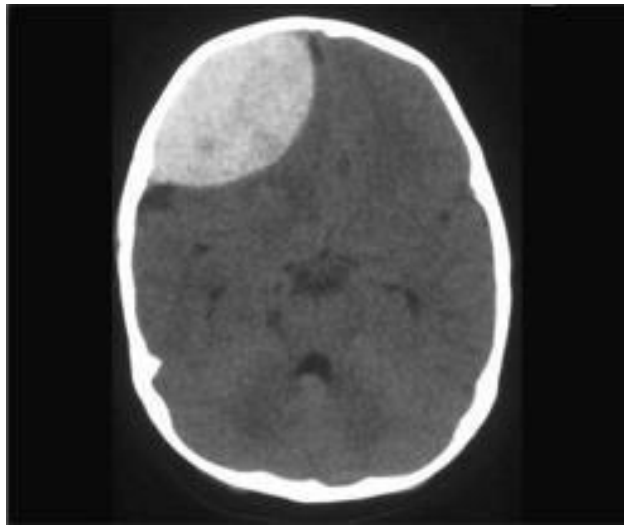
Current Treatment for TBI/Concussion

- Remove from play immediately!
- Physical and cognitive rest until asymptomatic
- Progressive return to play
- Medications (symptom control)
  - One symptom ⟶ One Drug
- Nothing addresses the BRAIN itself!
- Nothing for ***neuroprotection***, ***neuroinflammation*** and ***regeneration*** following TBI

Dr. Michael Lewis, AND Conference (2014)

Severe TBI





American Journal of Emergency Medicine (2013) 31, 273.e5–273.e8

ELSEVIER

The American Journal of Emergency Medicine

www.elsevier.com/locate/ajem

Teenager with severe TBI in auto accident

Case Report

Therapeutic use of omega-3 fatty acids in severe head trauma☆

Abstract

Traumatic brain injury (TBI) has long been recognized as the leading cause of traumatic death and disability. Tremendous advances in surgical and intensive care unit management of the primary injury, including maintaining adequate oxygenation, controlling intracranial pressure, and ensuring proper cerebral perfusion pressure, have resulted in reduced mortality. However, the secondary injury phase of TBI is a prolonged pathogenic process characterized by neuroinflammation, excitatory amino acids, free radicals, and ion imbalance. There are no approved therapies to directly address these underlying processes. Here, we present a case that was intentionally treated with substantial amounts of omega-3 fatty acids (n-3FA) to provide the nutritional foundation for the brain to begin the healing process following severe TBI. Recent animal research supports the use of n-3FA, and clinical experience suggests that benefits may be possible from substantially and aggressively adding n-3FA to optimize the nutritional foundation of severe TBI patients and must be in place if the brain is to be given the opportunity to repair itself to the best possible extent. Administration early in the course of treatment, in the emergency department or sooner, has the potential to improve outcomes from this potentially devastating public health problem.

Traumatic brain injury (TBI) has long been recognized as a leading cause of traumatic death and disability [1-3]. Tremendous advances in surgical and intensive care unit management of the primary injury, including maintaining adequate oxygenation, controlling intracranial pressure, and ensuring proper cerebral perfusion, have resulted in reduced mortality [3,4]. However, the secondary injury phase of TBI is a prolonged pathogenic process characterized by neuroinflammation, excitatory amino acids, free radicals, and ion imbalance [5]. There are no approved therapies to directly address these underlying processes. Here we present a case that was intentionally treated with substantial amounts of omega-3 fatty acids (n-3FA) to provide the nutritional foundation for the brain to begin the healing process following severe TBI.

In March 2010, a teenager sustained a severe TBI in a motor vehicle accident. After prolonged extrication, he was resuscitated at the scene and flown to a Level I Trauma Center. His Glasgow Coma Scale score was 3. Computerized tomography revealed panhemispheric right subdural and small temporal epidural hematomas and a 3-mm midline shift (Fig. 1). The patient underwent emergency craniotomy and intracranial pressure monitor placement. The patient was rated at Rancho Los Amigos Cognitive Scale Level I, and the attending neurosurgeon's impression was that the injury was likely lethal.

On hospital day 10, T2-weighted magnetic resonance imaging revealed right cerebral convexity subdural hemorrhage and abnormal fluid-attenuated inversion recovery signals consistent with diffuse axonal injury (Fig. 2). Believed to be in a permanent vegetative state, a tracheotomy and percutaneous endoscopic gastrostomy (PEG) tube were placed for custodial care; and enteral feedings were started (Promote; 80 mL/h; 1920 kcal/d). The following day, n-3FA were added to enteral feedings.

On day 10, it was recommended to the patient's father to procure Nordic Naturals (Watsonville, CA) brand Ultimate Omega from a local retail store. With the cooperation of the attending neurosurgeon and hospital pharmacy, the patient began receiving 15 mL twice a day (30 mL/d), providing 9756 mg eicosapentaenoic acid, 6756 mg docosahexaenoic acid (DHA), and 19212 mg total n-3FA daily via his PEG. On day 21, he was weaned off the ventilator and transported to a specialized rehabilitation institute 3 days later. His level of functioning was measured at Rancho Los Amigos Level III. The patient began therapy that gradually led to cognitive and physical improvements. Notably, the patient was given permission and attended his high school graduation 3 months after the injury to receive his diploma. He was discharged to home 4 months after the injury. Over the following year, Nordic Naturals generously donated a steady supply of Pro Omega-D (the professional version of Ultimate Omega) that also provided vitamin D3 (6000 IU). The patient remained on this level of n-3FA for more than 1 year and experienced no adverse effects. Two years later, the patient is at Rancho Los Amigos Level VIII, but

☆ Support: Therapeutic nutritional material as described in this manuscript was provided at no cost by Nordic Naturals, Inc, 111 Jennings Dr, Watsonville, CA 95076.

Omega-3s and TBI

- Teenager sustained TBI in Motor Vehicle Accident
- Glasgow Coma Scale score of 3 (deep unconsciousness)
- Right subdural and small temporal hematoma
- **Day 10**: believed to be in vegetative state, placed tracheotomy and PEG tube, started enteral feedings
  - Was not given the weekend to live
- **Day 11**: 9.7 g EPA, 6.7 g DHA provided via PEG tube
- **Day 21**: weaned off ventilator and began rehabilitation 3 days later

Omega-3s and TBI

Surviving a Mine Explosion

Lawrence Roberts, MD, Julian Bailes, MD, Harakh Dedhia, MD, Anthony Zikos, MD, Anil Singh, MD, Darby McDowell, RD, LD, Conrad Failinger, MD, Russell Biundo, MD, James Petrick, PhD, Jeffrey Carpenter, MD

In January 2006, an explosion in the Sago mine in central West Virginia resulted in 14 trapped miners. Approximately 41 hours later, one lone survivor was found and brought to medical care. It became apparent that the survivor had not suffered blast injuries, but rather hypoxia and exposure to toxic gases, dehydration, and rhabdomyolysis. During rapid prehospital care, followed by acute resuscitation and hospitalization, this patient demonstrated many classic features of carbon monoxide toxicity, including neurologic, cardiac, and renal dysfunction. In addition, the patient suffered from respiratory failure. Rapid resuscitation with end-organ perfusion and hyperbaric oxygen therapy treatment resulted in a dramatic improvement in all areas. After inpatient rehabilitation, the patient has returned to his wife, children, and family and is conversant and ambulating. This article explores the causes of these unique injuries, and a medical explanation for the extent of recovery in the sole survivor. To our knowledge, this is the first case of a survivor of prolonged exposure in a mining accident.

Case presentation

A 26-year-old man, a roof bolter on a coal mining team, was trapped with 13 other miners in the Sago Mine in north-central West Virginia on January 2, 2006. At the time of this writing, the leading theory is that an adjacent abandoned mine had an apparent accumulation of methane gas, and a resulting explosion from a presumed lightning bolt blasted out the wall between old and new mines. Immediate smoke and debris forced the 13 miners to a mine shaft that was farthest from the mine entry. The miners attempted to construct a barricade to preserve clean air, and used sledge hammers on ceiling bolts to attract attention. The miners used emergency air supplies. Smoke and toxic air was soon overwhelming and, based on best data including autopsy reports, the miners died of asphyxiation one by one. Several who died had high (>70%) carboxyhemoglobin levels. This case involves the only survivor, who was ultimately found in the mine adjacent to his perished fellow miners approximately 41 hours after the explosion. Delay in rescue was related to high levels of toxins and dense smoke in the mine preventing rescuers from entering. Carbon monoxide (CO) measurements in the air adjacent to where the miners were found measured 1,300 parts per million, and >2,000 parts per million at the surface mine exhaust fan opening.

The first rescuers to find the sole survivor found him sitting up but slumped, in respiratory distress with shallow breathing, and "gasping for breath." His jaw was clenched. Because of his shallow breathing, supplemental air supplied by the emergency breathing "rescuer" devices was only of limited benefit. The two rescuers carried the survivor on a stretcher 1/2 mile to a man-car on which he was transported the additional 2 1/2 miles out of the mine shaft. Evacuation to the surface once the survivor was found took >1 hour.

Emergency medical services responders initially expected multiple survivors. Supplemental oxygen by facemask was provided. An IV was started and crystalloid hydration begun. The patient was emergently transported to the nearest hospital. The initial neurologic examination showed that the patient was comatose and unresponsive to verbal stimuli. The Emergency Department physician promptly intubated the patient and began high-flow oxygen therapy. Carboxy-hemoglobin (HbCO) was measured at <20% using a 30% sodium hydroxide HbCO screening test.[1] A Foley catheter was placed, which yielded minimal urine. The patient was transported by ground to the Jon Michael Moore Trauma Center of West Virginia University in Morgantown, WV. Air evacuation was not possible because of weather and fog. Evaluation in the trauma bay confirmed proper endotracheal tube placement, and chest x-ray demonstrated opacification of the left hemithorax, suggestive of lung collapse (atelectasis.) The patient re-

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From the Division of Trauma, Department of Surgery (Roberts), Division of Pulmonary Care and Critical Care, Department of Neurosurgery (Bailes), Department of Medicine (Dedhia), Department of Radiology (Carpenter), and Division of Cardiology (Failinger), West Virginia University School of Medicine, Morgantown, WV, Dietary Services, West Virginia University Hospital, Morgantown, WV (McDowell), Healthsouth Rehabilitation Hospital, Morgantown, WV (Biundo, Petrick), and Division of Pulmonary and Critical Care and Hyperbaric Medicine, Allegheny General Hospital, Pittsburgh, PA (Zikos, Singh).

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doi:10.1016/j.jamcollsurg.2008.02.015

Played by Alec Baldwin in Concussion

- One lone survivor out of 14
- Suffered from respiratory distress due to elevated CO levels
- Lung collapse
- Unresponsive and comatose
- **Given high dosage of Fish Oil through PEG tube**
- **Had full recovery**

DOI: 10.3171/2010.5.JNS08914

J Neurosurg / July 16, 2010

Omega-3 fatty acid supplementation and reduction of traumatic axonal injury in a rodent head injury model

Laboratory investigation

James D. Mills, M.D.,[1] Julian E. Bailes, M.D.,[1] Cara L. Sedney, M.D.,[1] Heather Hutchins, M.S., R.D.,[2] and Barry Sears, Ph.D.[2]

[1]*Department of Neurosurgery, West Virginia University School of Medicine, Morgantown, West Virginia; and* [2]*Inflammation Research Foundation, Marblehead, Massachusetts*

Object. Traumatic brain injury remains the most common cause of death in persons under 45 years of age in the Western world. Recent evidence from animal studies suggests that supplementation with omega-3 fatty acid (O3FA) (particularly eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]) improves functional outcomes following focal neural injury. The purpose of this study is to determine the benefits of O3FA supplementation following diffuse axonal injury in rats.

Methods. Forty adult male Sprague-Dawley rats were used. Three groups of 10 rats were subjected to an impact acceleration injury and the remaining group underwent a sham-injury procedure (surgery, but no impact injury). Two of the groups subjected to the injury were supplemented with 10 or 40 mg/kg/day of O3FA; the third injured group served as an unsupplemented control group. The sham-injured rats likewise received no O3FA supplementation. Serum fatty acid levels were determined from the isolated plasma phospholipids prior to the injury and at the end of the 30 days of supplementation. After the animals had been killed, immunohistochemical analysis of brainstem white matter tracts was performed to assess the presence of β-amyloid precursor protein (APP), a marker of axonal injury. Immunohistochemical analyses of axonal injury mechanisms—including analysis for caspase-3, a marker of apoptosis; RMO-14, a marker of neurofilament compaction; and cytochrome c, a marker of mitochondrial injury—were performed.

Results. Dietary supplementation with a fish oil concentrate rich in EPA and DHA for 30 days resulted in significant increases in O3FA serum levels: 11.6% ± 4.9% over initial levels in the 10 mg/kg/day group and 30.7% ± 3.6% in the 40 mg/kg/day group. Immunohistochemical analysis revealed significantly ($p < 0.05$) decreased numbers of APP-positive axons in animals receiving O3FA supplementation: 7.7 ± 14.4 axons per mm^2 in the 10 mg/kg/day group and 6.2 ± 11.4 axons per mm^2 in the 40 mg/kg/day group, versus 182.2 ± 44.6 axons per mm^2 in unsupplemented animals. Sham-injured animals had 4.1 ± 1.3 APP-positive axons per mm^2. Similarly, immunohistochemical analysis of caspase-3 expression demonstrated significant ($p < 0.05$) reduction in animals receiving O3FA supplementation, 18.5 ± 28.3 axons per mm^2 in the 10 mg/kg/day group and 13.8 ± 18.9 axons per mm^2 in the 40 mg/kg/day group, versus 129.3 ± 49.1 axons per mm^2 in unsupplemented animals.

Conclusions. Dietary supplementation with a fish oil concentrate rich in the O3FAs EPA and DHA increases serum levels of these same fatty acids in a dose-response effect. Omega-3 fatty acid supplementation significantly reduces the number of APP-positive axons at 30 days postinjury to levels similar to those in uninjured animals. Omega-3 fatty acids are safe, affordable, and readily available worldwide to potentially reduce the burden of traumatic brain injury. *(DOI: 10.3171/2010.5.JNS08914)*

Omega 3 and TBI

- 40 adult male Sprague Daley rats
- 3 groups of 10 rats received accelerated impact injury and the remaining surgery (sham injury)
- 2 groups supplemented with 10 or 40 mg/kg/day
- No supplementation for 1 injured group and Sham injury group

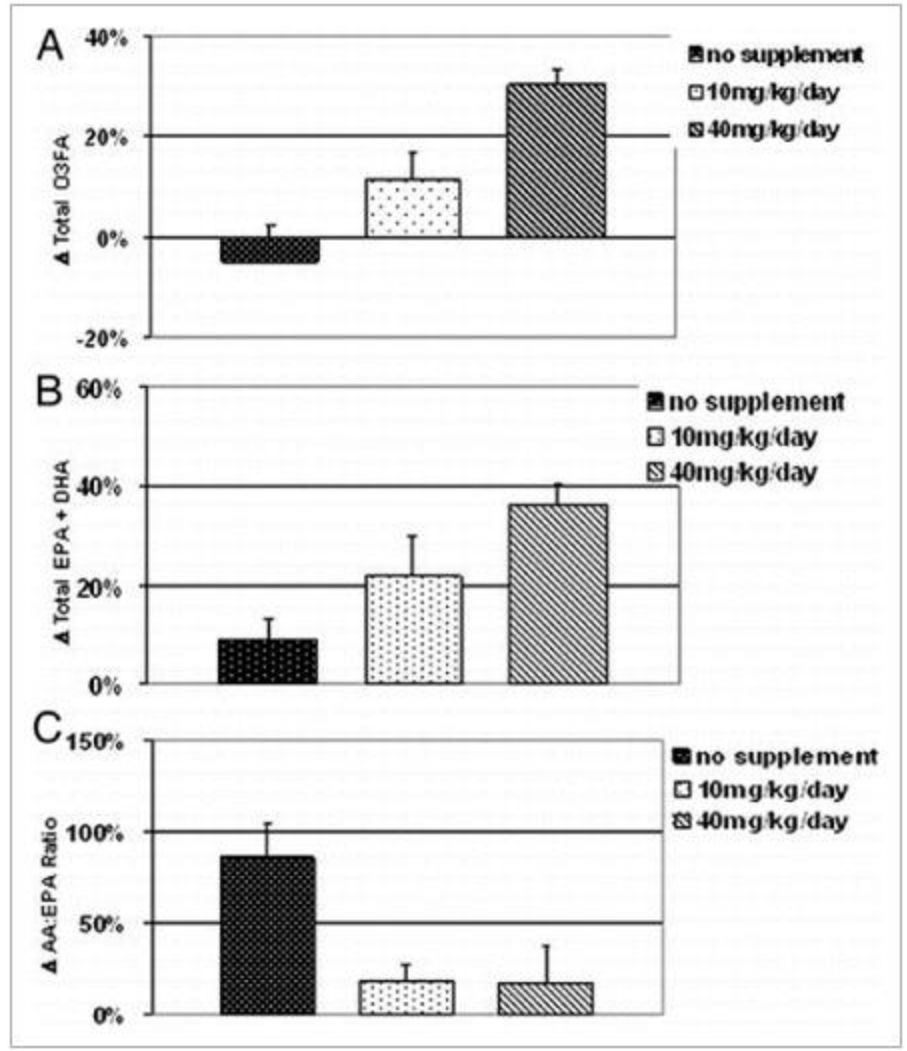


FIG. 1.

Graphs showing that oral supplementation with either 10 mg/kg/day or 40 mg/kg/day of concentrated fish oil for 30 days increased serum total O3FA levels **(A)** and combined EPA and DHA levels **(B)**. The AA/EPA ratio, a marker of systemic inflammation, was significantly lower in animals receiving fish oil supplementation than in unsupplemented animals **(C)**. The y axis values represent the percentage increase (or decrease) compared to preinjury values.

Omega 3 and TBI

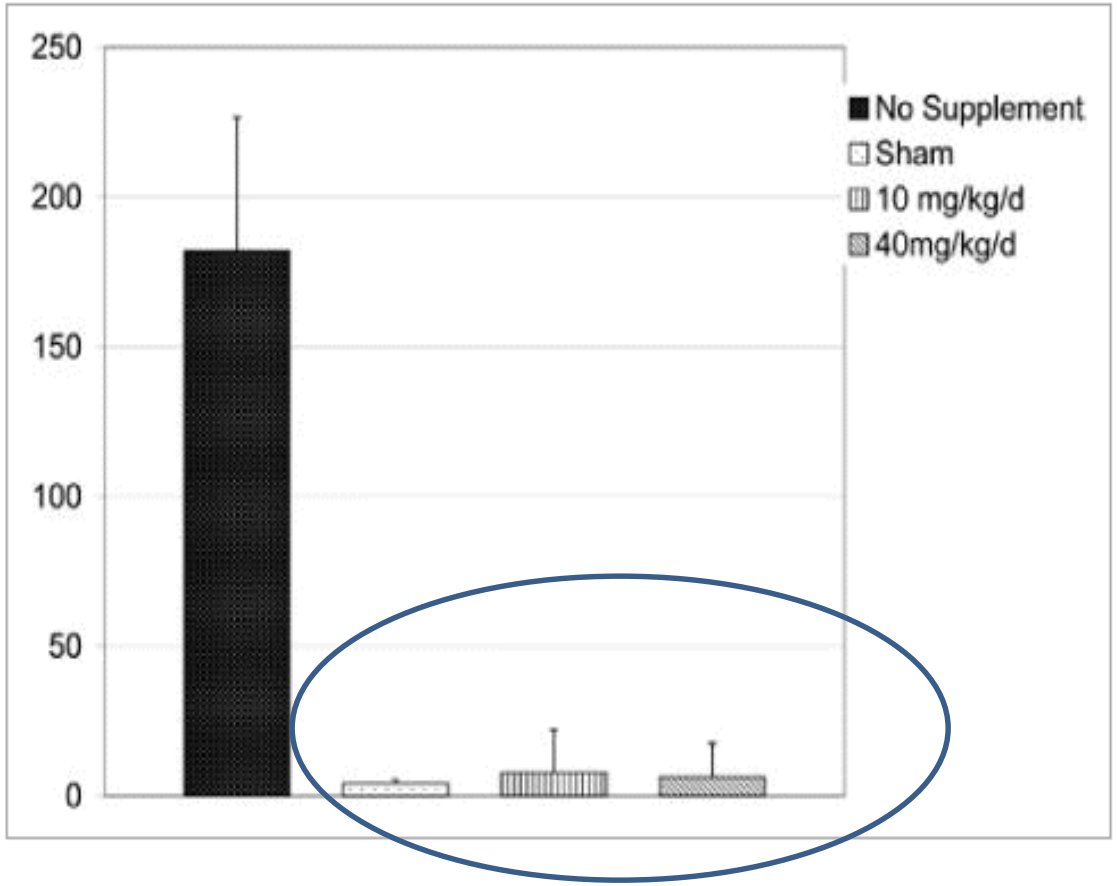


FIG. 3.

Graph demonstrating the density of APP-positive axons in corticospinal tracts and medial lemnisci in sham-injured, unsupplemented, and O3FA-supplemented rats. * $p < 0.05$, significantly different from the 3 other groups.

Omega 3 and TBI/Concussion

- **Neurofilament Light (NFL) = key intermediate fibers in neurons and the axonal skeleton**
- Unsure mechanism of release and appearance of NFL in biological fluids
- **Do know significant changes in NFL as a result of axonal injury**
- Elevations in cerebrospinal fluid (CSF) and NFL reported in boxers sustaining concussive or sub-concussive head impacts
- Also seen elevations in CSF and NFL in patients suffering from neurodegenerative and neuro-inflammation related diseases

Siedler et al. (2014) Front Cell Neurosci
Neselius et al. (2012) Plos ONE

Omega 3 and TBI

Medicine & Science in Sports & Exercise, Publish Ahead of Print
DOI: 10.1249/MSS.0000000000000875

Effect of Docosahexaenoic Acid on a Biomarker of Head Trauma in American Football

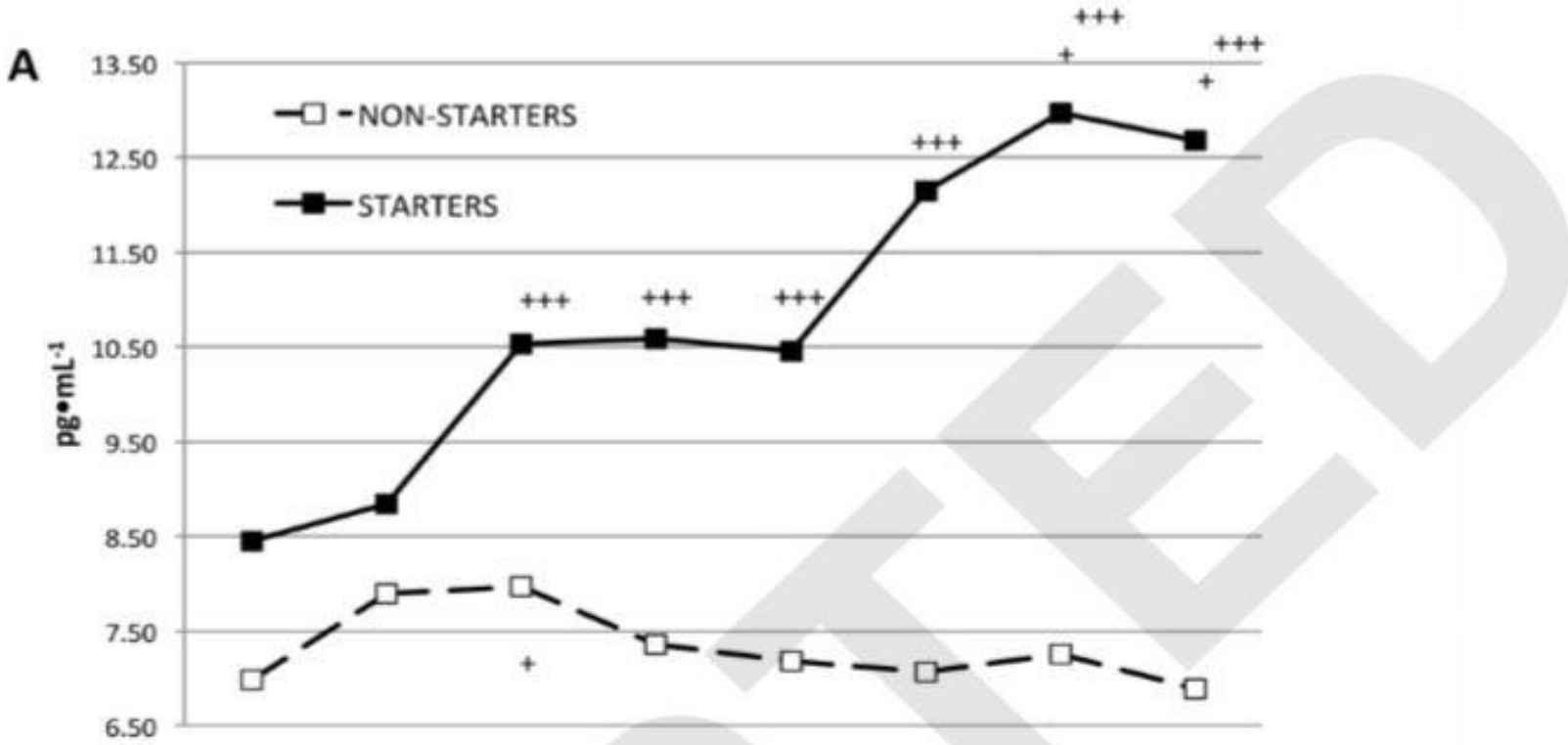
Jonathan M. Oliver[1], Margaret T. Jones[2], K. Michele Kirk[1,3,4], David A. Gable[1,3], Justin T. Repshas[1], Torie A. Johnson[1], Ulf Andréasson[6], Niklas Norgren[5], Kaj Blennow[6], and Henrik Zetterberg[6,7]

Omega 3 and TBI

- **Purpose:** To examine the effects of DHA supplementation on Neurofilament light (NFL) – marker of Axonal injury
- **Methods:** RDBPC study with 81 NCAA Divison 1 football players to ingest 2g/d, 4g/d, 6g/d of DHA or placebo (corn oil)
- **Design:** Examined 189 days (57 days summer conditioning, 23 days pre-season camp, and 109 days of season)

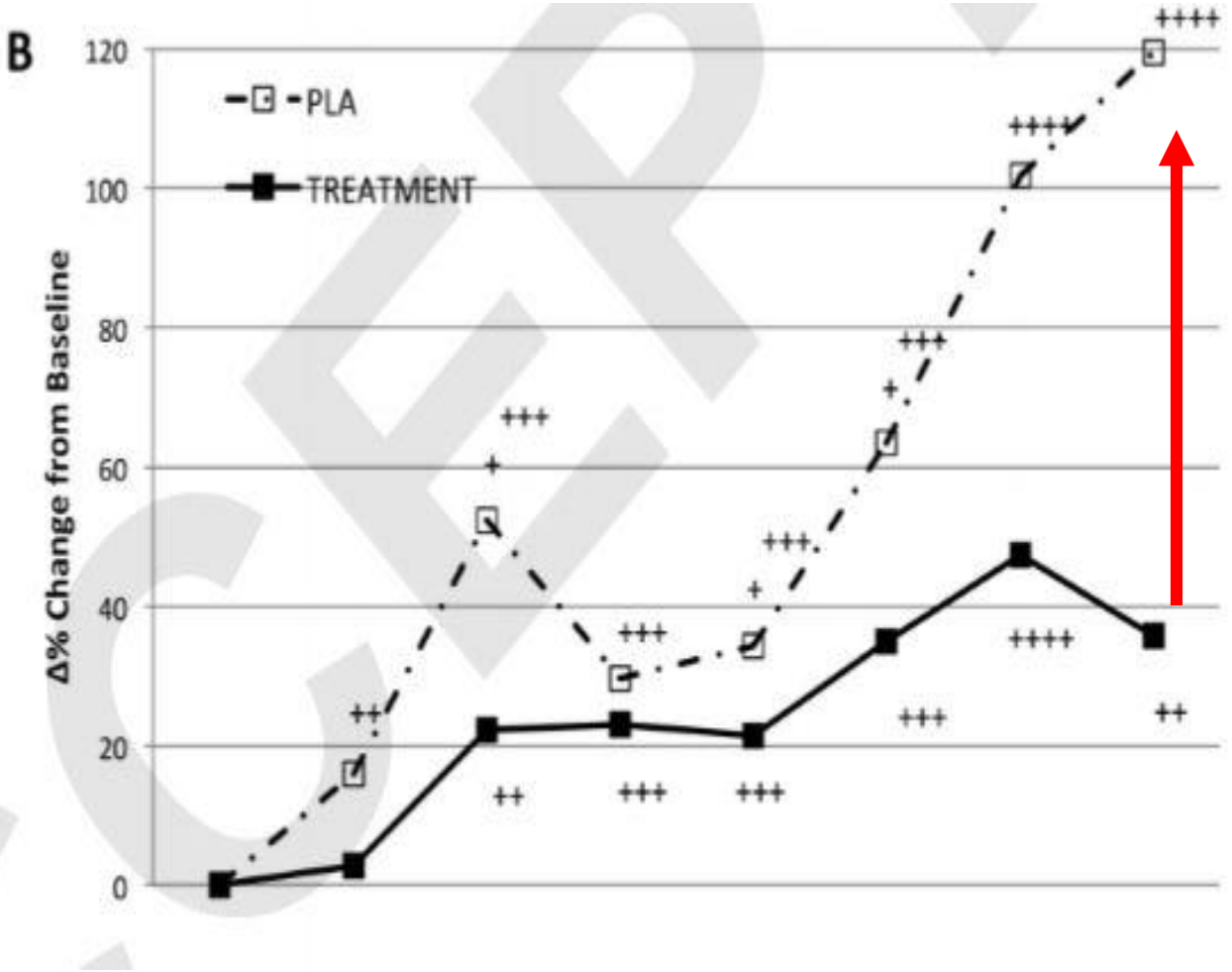
Oliver et al. (2016) Med Sci Sports Exerc

Omega 3 and TBI/Concussion



Changes in serum neurofilament light (pg•mL-1) over the course of the study in starters and non-starters

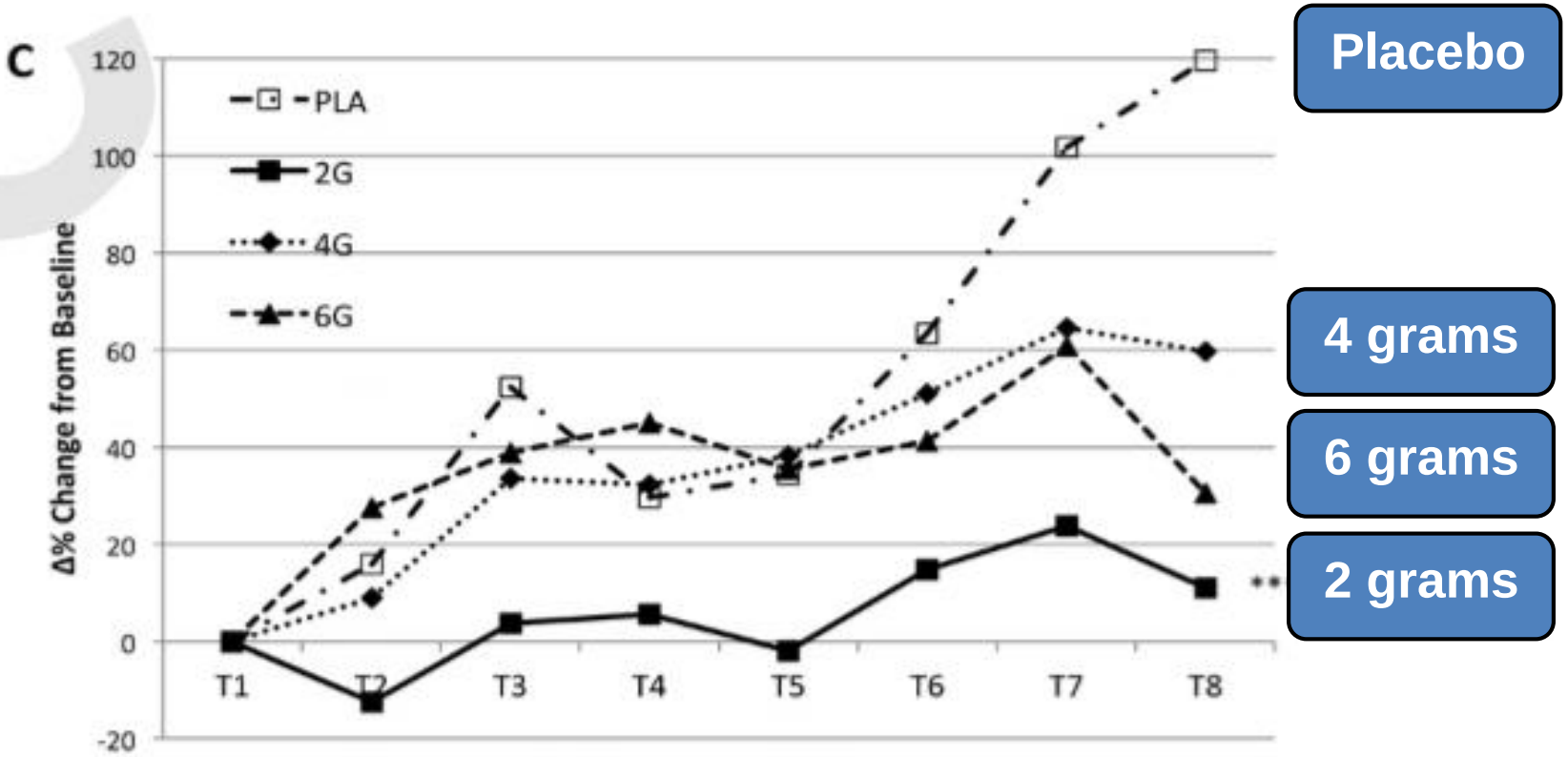
Omega 3 and TBI/Concussion



Significant difference

Effect of supplemental docosahexaenoic acid (DHA) on serum neurofilament light (% change from baseline) over the course of the study in starters;

Omega 3 and TBI



Placebo

4 grams

6 grams

2 grams

Effect of supplemental docosahexaenoic acid (DHA) on serum neurofilament light (% change from baseline) over the course of the study in starters across all doses and separated by dosage;

Protocol for Athletes

Usage	Treatment
General Health	2-3 grams per day
Body Composition	2-4 grams per day
Inflammation	2-4 grams per day
Depression	2-4 grams per day
TBI/Concussion	9-12 grams for 1-2 weeks post

Concussion protocol from Dr. Michael Lewis' work, Brain Health Education Network

Certified for Sport

- **Certified for Sport**
- **Eliminates risk for contamination and banned substances**

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Nutrition App

Vitamin D

- **Purpose and Function**
  - Critical in helping the body to absorb calcium needed to maintain bone mass and to minimize musculoskeletal pain and injury risk
  - Recent studies have shown that vitamin D levels have a direct relationship with muscle power, force, velocity and optimal bone mass
- **Made available from:**
  - Fish, added to dairy products in the US, and available as an oral supplement
  - Vitamin D also is produced in the body through sun exposure
    - Sunscreen usage

USC Study in Vitamin D Insufficiency

USC study demonstrated low levels in one out of three elite NCAA Division I athletes tested

- Athletes with darker skin tones had a “much higher risk” for insufficient vitamin D levels
  - Black athletes were 19.1 times more likely than white athletes
  - Hispanics were 6.1 times more likely



Vitamin D

- What's the problem?
  - Low sources in food supply

Sources of Vitamin D	Amounts in IU
Cod Liver Oil (1 tbsp)	1360 IU
Wild Salmon (3.5 oz)	927 IU
Farmed Salmon (3.5 oz)	250 IU
Milk or Fortified Juice (1 cup)	100 IU
Fortified Cereals (2/3 cup)	40 IU
Egg Yolk	25 IU
Sun (UVB rays) via skin	290-320 nm

NFL Study in Vitamin D Insufficiency

- (2011) Hospital of Special Surgery in New York funded a study in collaboration with a single National Football League team
  - **81% of players had abnormal vitamin D** levels and indicated significantly lower levels among athletes who sustained muscle injuries
    - Researchers found deficient vitamin D levels in 27 (30.3%) of the players examined
    - 45 players (50.6%) displayed vitamin D levels consistent with insufficiency
    - Remaining 17 players displayed vitamin D values described as within normal limits

DATA retrieved from: 2011 Annual Meeting of the American Academy of Orthopedic Society for Sports Medicine(AAOSM), Michael Shindle, MD

NFL Study in Vitamin D Insufficiency

- Follow-up data: Pittsburgh Steelers
  - To assess vitamin D levels to evaluate the association of vitamin D levels with race, fracture history, and the ability to obtain a contract position.
    - All athletes who were vitamin D deficient were black.
    - Vitamin D levels were significantly lower in players with at least **1 bone fracture** when compared with no fractures.
    - Players who were released during the pre-season because of either injury or poor performance had significantly lower vitamin D levels than did players who played in the regular season.

Am J Sports Med. 2015 May;43(5):1241-5. doi: 10.1177/0363546514567297. Epub 2015 Feb 3

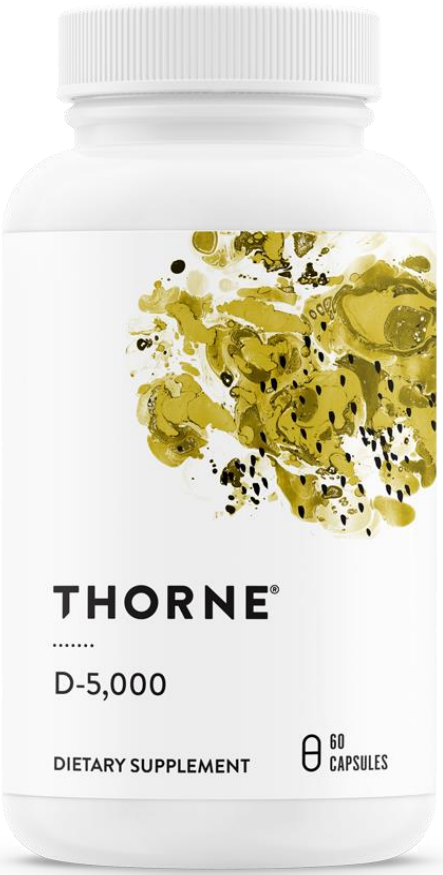
What's the Risk: Vitamin D Toxicity

Jan 6, 2015- altmedicine.about.com

- Fat Soluble
  - Too much Vitamin D can result in high levels of calcium in the blood (hypercalcemia), which can lead to:
    - Calcium deposits in soft tissues such as the lungs or heart,
    - Confusion, nausea, vomiting, constipation,
    - Kidney damage and kidney stones, weight loss, poor appetite.
- No guarantee of purity
- RDA suggests 600 IU daily (D3 most bioavailable)
- Normal Vitamin D blood levels range from 30-80 ng/ml depending on the lab

Vitamin D Recommendations

- Get (25 OH) levels tested
- Dosage dependent on blood work
- Minimal dosage



Eat 2 Win
Nutrition App

SUPPLEMENTS FOR STRENGTH
&
POWER ATHLETES

Eat 2 Win
Nutrition App

Protein

- What are the functions of protein?
  - Repair and rebuild damaged muscle tissue
  - Collagen protection/regeneration
  - Promotes satiety (keeps you full)
  - Increases metabolic rate (thermogenesis) – functions of improving body composition
  - Increased Nitrogen status
    - Positive Nitrogen = improved protein balance in body
  - Increase anabolic hormone release
    - Glucagon (facilitates fat loss from adipose tissue)
    - Insulin & IGF – may increase muscle fiber size

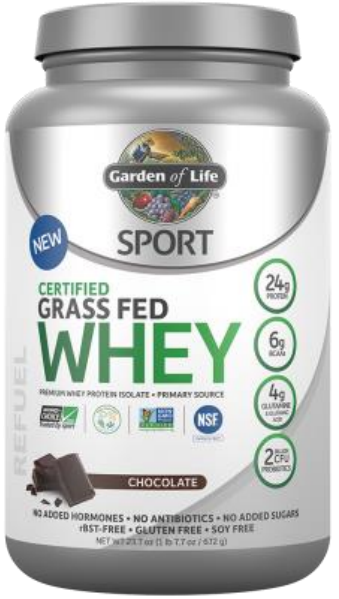
Protein

- Many Misconceptions about it's function and use by athletes
  - "More protein helps me gain weight and get bigger"
  - "Protein is a good source of energy"
  - "Protein will make me stronger"
- **Primary Function** – to repair and regenerate damaged muscle tissue (ex. After Resistance training)

Eat 2 Win
Nutrition App

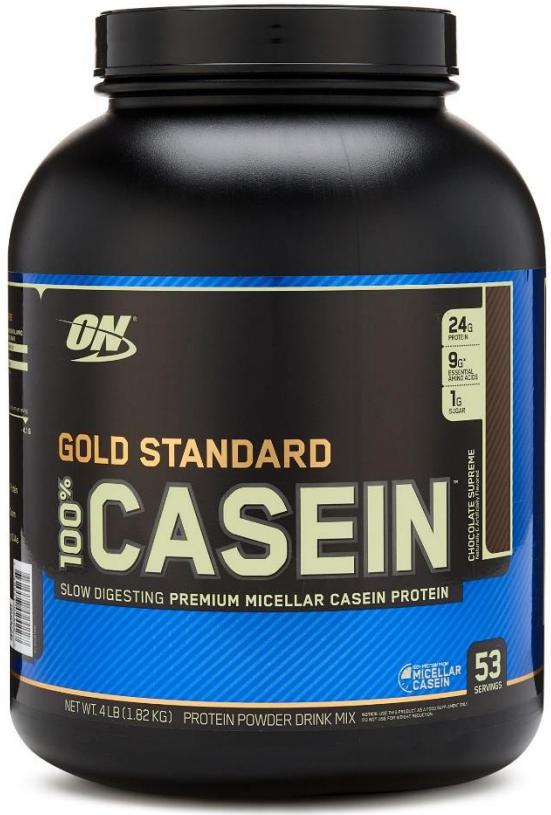
Protein

- **Function of Whey Protein**
  - Contain great combination of Essential Amino Acids (Leucine)
  - Designed to shock blood amino acid levels
    - Levels are low – in morning and during and after training ---**Catabolic States**
  - Quick absorption on GI tract and in bloodstream
  - Peak amino acids levels at 60-90 minutes after ingestion (return to baseline 3-4 hours



Protein

- **Function of Casein Protein**
  - Slow acting protein (4-6 release of amino acids)
  - Best to use at night 30 minutes before bed
- **Other Proteins Sources of Benefit**
  - Soy (Non-GMO)
  - Pea Protein
  - Hemp Protein



Protein and Athletes

- What is best for athletes?
- Is there a form better for post workout nutrition?
- Does it matter if you take 70-80 g of whey all at once or would it be better spread your protein out throughout the day?

Eat 2 Win
Nutrition App

Protein

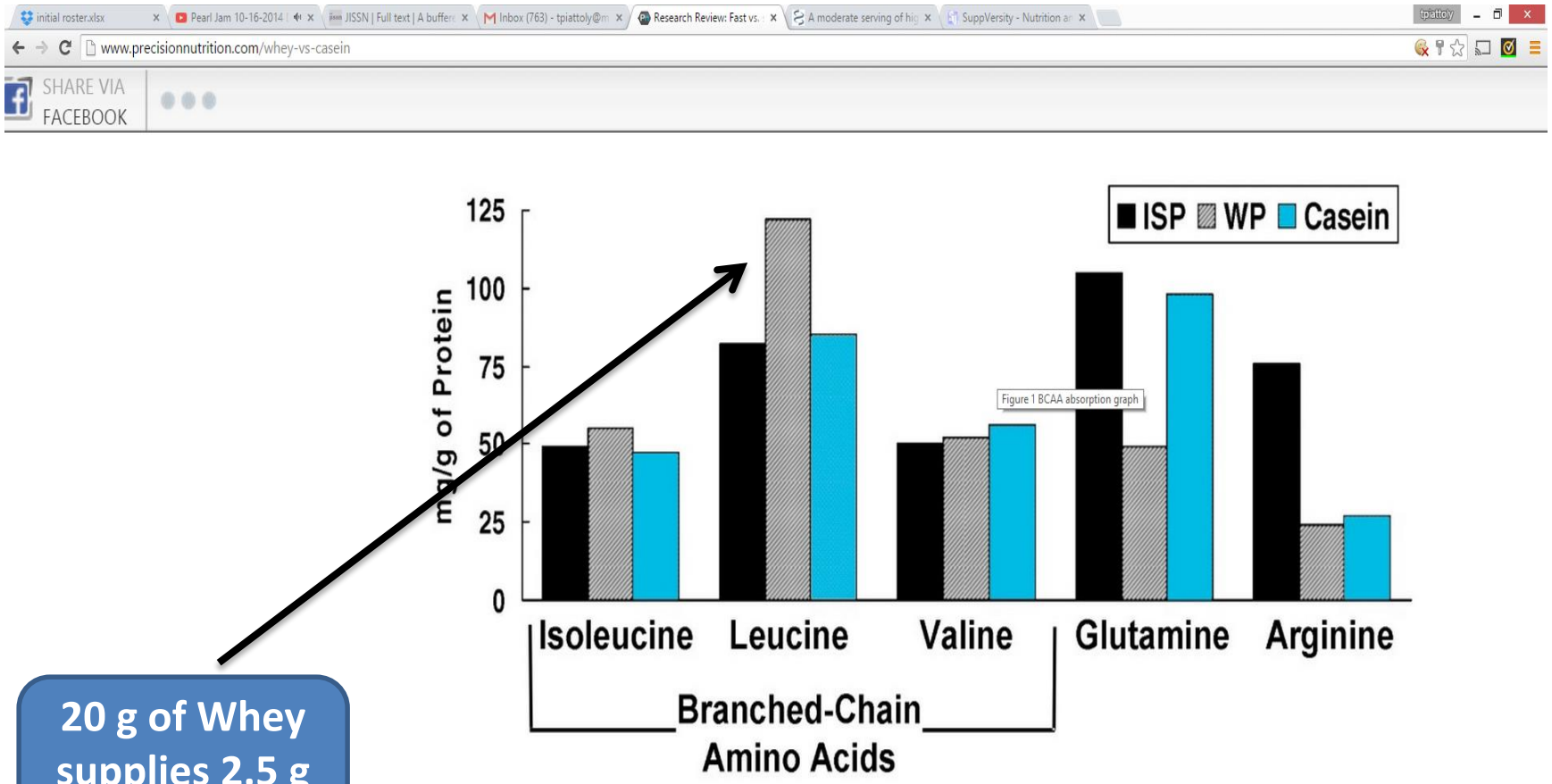


Figure 1 - Concentrations of isoleucine, leucine, valine, glutamine and arginine in isolated soy protein (ISP), whey protein (WP) and casein. Values are grams per 100 grams of protein. Adapted from (2).

How much Protein?

- **Daily needs:** .8 grams per pound body weight
  - Ex: 200 lb athlete = 160 grams of protein
- **Post Workout:** 20-40 grams post workout to optimize protein synthesis (specific to fast digesting protein)
- To maximize muscle growth (0.4 grams/kg/meal) over 4-5 meals per day.
- 1.6 g/kg body weight (minimum needs) vs 2.2 g/kg body weight (maximum needs).
- 200 lb athlete (91kg) = 146-200 grams (0.7-1 gram/lb)

- **Ingested protein dose response of muscle and albumin protein synthesis after resistance exercise in young men.** *Am J Clin Nutr. 2009.*

- **How much protein can the body use in a single meal for muscle building? Implications for daily protein distribution.** *JISSN. 2018*

Protein Bottom Line

- Adequate protein spread out throughout the day is best
- Shoot for .7-8 grams per pound of body weight but not more than 1 gram per pound
- Taking Protein powder doesn’t = weight gain
  - Must be in a calorie surplus
- Either Whey or Casein will work just fine
- Blend of Whey and Casein post workout may be a great option to have a combo of fast and slow acting proteins

Creatine Supplementation

Creatine

- Synthesized from Methionine, Arginine, and Glycine (Amino Acids)
- Remainder (1-2 grams) found in diet (Salmon, beef)
- 2/3 is found in muscle as Phosphocreatine (PC)
- 5% is in brain and testes
- Rest is Free Creatine (FC)
- Total Creatine Pool (Muscle Creatine + FC) = 120 grams (70 kg Male athlete)
- Body has capacity to store 160 grams under certain conditions (Wasting conditions – stress, trauma, HIV)
- 1-2% is broken down into creatinine – excreted in urine (2 g/day turnover rate)

Creatine content of Food

Food	Creatine Content g/lb
Herring	3 – 4.5
Pork	2.3
Beef	2
Salmon	2
Tuna	1.8
Cod	1.4
Milk	0.05
Shrimp	Trace

Creatine Monohydrate

- Benefits of Creatine Supplementation
- Increasing PCr availability to working muscle may maintain a high level of intensity/workload
- Repeated bouts of intense activity
  - Sprinting
  - Explosive Power
  - Increases Fat Free Mass
  - Endurance Athletes (decrease in lactate during supplementation)

- Promotes maintenance of glycogen when combined with carbohydrate
- Greater training tolerance
- Increased Work capacity

Creatine
"Side Effects"

- Only clinical side effect has been **Weight Gain**
- Cases of Diarrhea if taken in large dosages at once
- Anecdotal side effects have included:
  - Dehydration
  - Muscle cramping
  - Increased risk of musculoskeletal injuries
  - GI distress
  - Renal Stress or Liver Function
  - Restlessness when taken an hour before sleep

Creatine

Research & Safety

- Over 48,000 studies in a pubmed review
- Over 1500 have examined exercise performance
- 70% of those have demonstrated a significant improvement in exercise capacity
  - Strength
  - Sprint Performance
  - Power
  - Fat Free Mass
- Other studies look at disease states involving atrophy (Lou Gehrig's, muscular dystrophy, spinal cord injuries, etc.)

Creatine Supplementation

- Benefits in clinical populations:
  - Fibromyalgia
  - Huntington's Disease
  - COPD
  - Parkinson's
  - Psychiatric Disorders
  - **Concussion Treatment/TBI**
    - Crosses blood brain barrier
  - Children with Inborn Errors of Creatine Metabolism

Creatine Research

Which form is best?

www.ncbi.nlm.nih.gov/pmc/articles/PMC2649889/pdf/1550-2783-6-6.pdf - Google Chrome

www.ncbi.nlm.nih.gov/pmc/articles/PMC2649889/pdf/1550-2783-6-6.pdf

Journal of the International Society of Sports Nutrition

BioMed Central

Research article

Open Access

The effects of creatine ethyl ester supplementation combined with heavy resistance training on body composition, muscle performance, and serum and muscle creatine levels

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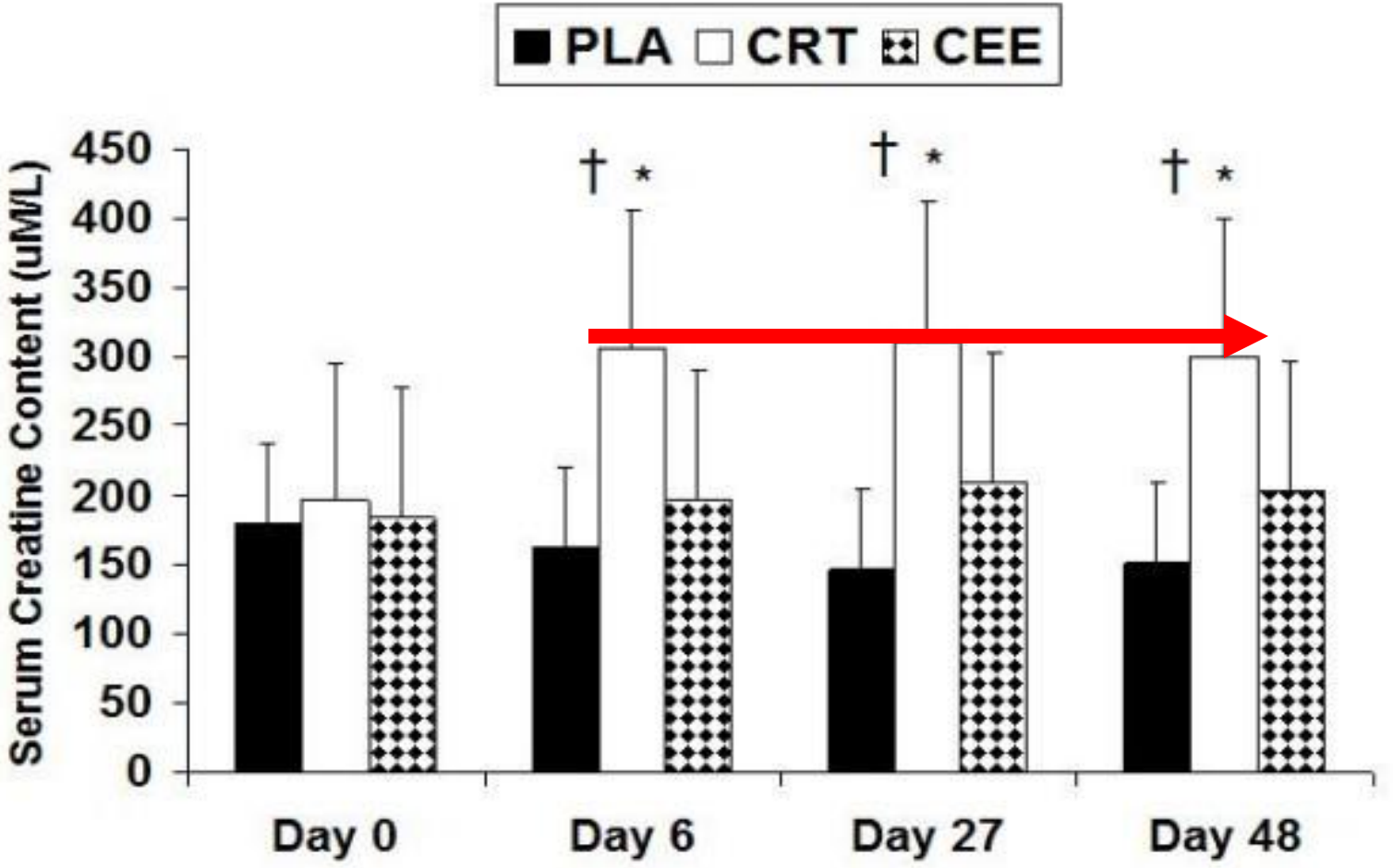
Abstract

Numerous creatine formulations have been developed primarily to maximize creatine absorption. Creatine ethyl ester is alleged to increase creatine bio-availability. This study examined how a seven-week supplementation regimen combined with resistance training affected body composition, muscle mass, muscle strength and power, serum and muscle creatine levels, and serum creatinine levels in 30 non-resistance-trained males. In a double-blind manner, participants were randomly assigned to a maltodextrose placebo (PLA), creatine monohydrate (CRT), or creatine ethyl ester (CEE) group. The supplements were orally ingested at a dose of 0.30 g/kg fat-free body mass (approximately 20 g/day) for five days followed by ingestion at 0.075 g/kg fat free mass (approximately 5 g/day) for 42 days. Results showed significantly higher serum creatine concentrations in PLA ($p = 0.007$) and CRT ($p = 0.005$) compared to CEE. Serum creatinine was greater in CEE compared to the PLA ($p = 0.001$) and CRT ($p = 0.001$) and increased at days 6, 27, and 48. Total muscle creatine content was significantly higher in CRT ($p = 0.026$) and CEE ($p = 0.041$) compared to PLA, with no differences between CRT and CEE. Significant changes over time were observed for body composition, body water, muscle strength and power variables, but no significant differences were observed between groups. In conclusion, when compared to creatine monohydrate, creatine ethyl ester was not as effective at increasing serum and muscle creatine levels or in improving body composition, muscle mass, strength, and power. Therefore, the improvements in these variables can most likely be attributed to the training protocol itself, rather than the supplementation regimen.

Creatine Research

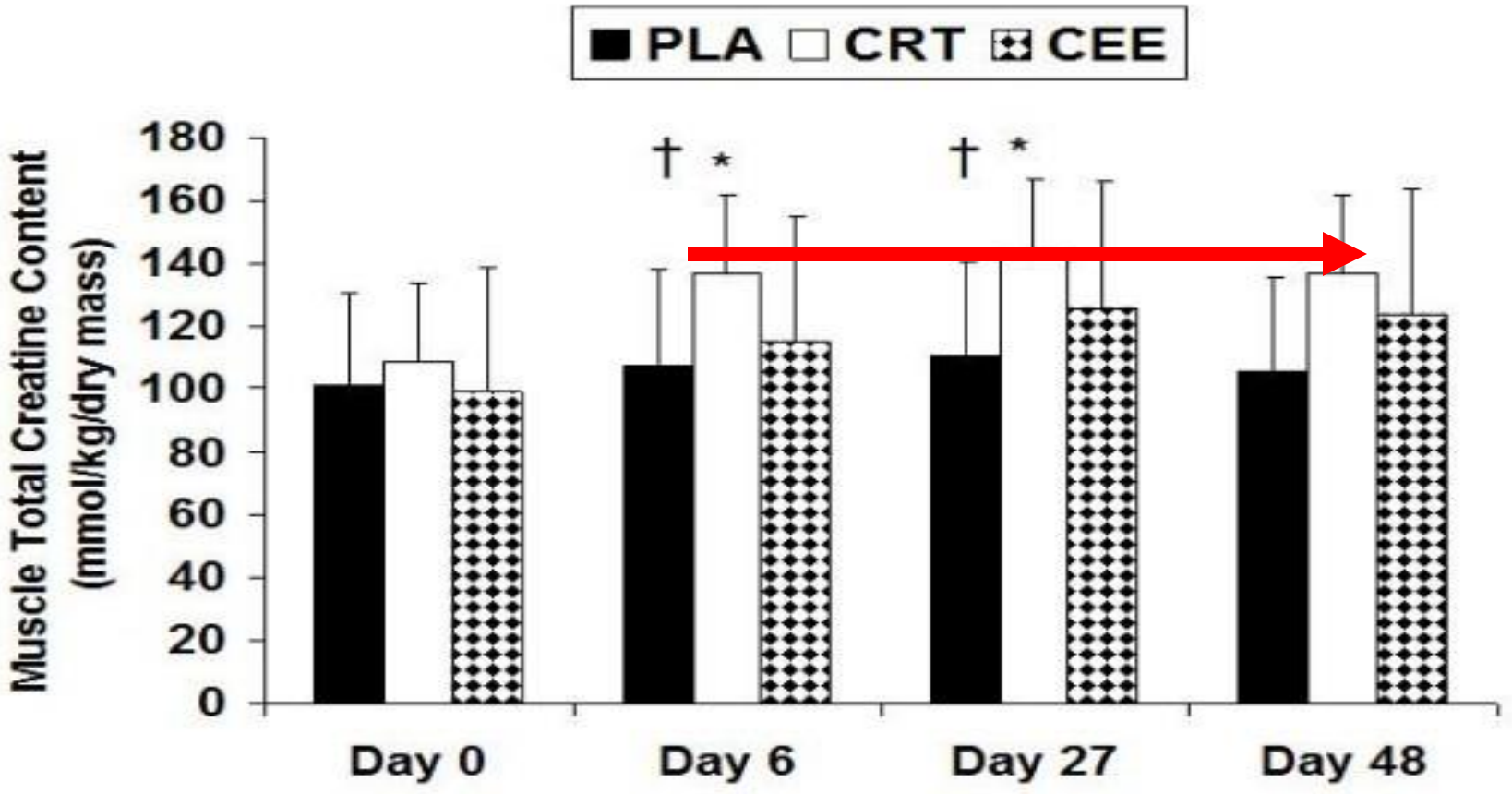
- **Creatine Mono (CM) vs. Creatine Ethyl Ester (CEE)**
  - **Subjects:** 30 non-trained subjects
  - **Dose:** 0.3 g/kg fat free mass (20g/day) for five days followed by 0.075 g/kg (5 grams) for 42 days of Placebo (Maltodextrin), CM, CEE

Creatine Research



Changes in serum creatine concentrations with data expressed as mean (± SD). † indicates significantly higher serum creatine concentrations in CRT when compared to PLA ($p = 0.007$) and CEE ($p = 0.005$). * indicates significant differences for CRT occurred at days 6 ($p = 0.028$), 27 ($p = 0.014$), and 48 ($p = 0.032$).

Creatine Research



Changes in muscle total creatine with data expressed as mean (± SD). † indicates a significant difference among groups where the PLA group was significantly less than the CRT (p = 0.026) and CEE (p = 0.041) groups. * indicates significant differences over the course of the four testing sessions where CRT increased at day 6 (p = 0.041) and 27 (p= 0.036), and CEE only increased at day 27 (p = 0.043).

Safety of Creatine

- **Long Term Study #1 on Kidney Function**
  - Administered 5-20g/day for 5 years in Div I football players
    - No significant effect on liver or kidney function
    - Conclusion: No long-term side effects in trained athletes besides weight gain
    - Dehydration was reported only in athletes who didn't consume enough fluids during supplementation

Mayhew D., Mayhew J., Ware J. *Int. J Sports Med* 2002, 12, 453-460.

Safety of Creatine

- Long Term Study #2
  - Administered to 15.75 g for 5 days and then 5-10g/day for 21 months following training sessions
  - 98 athletes (included a non-creatine group)
  - Neither group demonstrated any changes in blood or urine markers

  - Kreider et al (2003). *Mollecular and Cellular Biology*

Is Creatine Safe for Young Athletes?

- **Creatine and Muscular Dystrophy**
  - 30 boys with Duchenne MD (50% taking Corticosteroids)
  - 4 months of CM at 0.1 g/kg/day
  - Improvement in Handgrip strength and FFM in CM group
  - **No side effects**
  - ***Tarnopolsky et al. (2004) Neurology***

- **Creatine and Acute Lymphoblastic Leukemia**
  - 0.1 g/kg/day for two 16 week periods
  - 16 wks Creat – 6 wks washout – 16 wks Creat
  - Equivalent to 6.8 grams for a 150 lb person
  - **No side effects**
  - ***Bourgeois et al. (2008) Pediatric & Blood Cancer***

Is Creatine Safe for Young Athletes?

- **Creatine and and TBI in Kids**
  - 39 kids with TBI (ages 1-18 yrs)
  - 0.4 g/kg per day for 6 months (***27 g/day for 150 lb person)***
  - Demonstrated benefits of post-traumatic amnesia (PTA), duration of intubation, intensive care unit (ICU) stay, disability, good recovery, self care, communication, locomotion, sociability, personality/behavior and neurophysical, and cognitive function
  - No side effects
  - ***Sakellaris et al. (2006) J of Trauma***
  - ***Sakellaris et al. (2008) Acta Pediatrics***

Is Creatine Safe for Young Athletes?

- **Creatine and Exercising Kids**
  - Sixteen male swimmers (age 15.9 ± 1.6 years)
  - **Dose:** 4 x 5 g/day CM for 5 days vs. Placebo
  - **Results:** Power output in rebound jumps improved 20.2%
  - No side effects
  - ***Juhasz et al. (2009) Acta Physiologica Hangarica***

- **Creatine and Infants**
  - 34 infants separated into 2 groups (Avg. Gestational age of 27 weeks vs 29 weeks)
  - Measuring effects on hypoxemia and bradycardia in infantst with Apnea of Prematurity (AOP)
  - Received oral Creatine at 200mg/kg for 2 weeks (= to a 13.6 g daily dose for a 150 lb person)
  - Oral Creatine was well tolerated and No Side effects noted

Creatine

- **Safety in teenage athletes (< 18 years old)**
  - No study has indicated any harmful side effects
  - Very little is known about long-term Creatine supplementation in young athletes
  - Lots of mis-information being presented in the athletic and medical community about Creatine

Creatine Supplementation

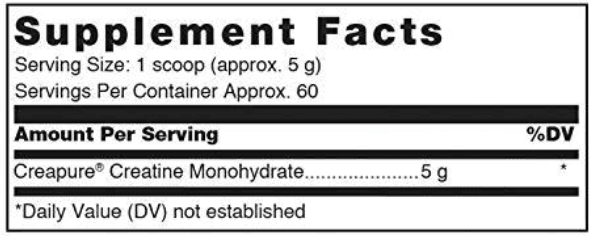
- **Recommended Dosages for High School Athletes:**
  - 5 Grams –Post Workout
  - No loading phase – no research to demonstrate safety on liver and kidney in young athletes

Creatine

- **Recommendations for Young athletes**
  - Only useful if participating in serious/competitive training and may benefit from supplementation
  - Athlete is eating a well balanced diet
  - Parents understand the potential benefits
  - Parents approve supplementation
  - Quality supplements are used (mentioned previously)
  - Do not exceed recommended dosages
  - It’s a much safer alternative than Anabolic Steroids
  - It’s not a short cut to success but a benefit to optimize performance

Creatine

- What type should your athletes take?
  - 3 primary sources (US, Germany, China)
  - NSF 3rd party tested Creatine
  - Best source
    - Germany's – Alzchem's Creapure™



Supplements for Inflammation

- **What's the purpose of recovery?**
  - Reduce muscle damage and Inflammation
    - Markers include Creatine Kinase, Myoglobin, CRP
  - Delay muscle soreness
  - Reduce any swelling or tissue inflammation from injury

Supplements for Inflammation

- Omega 3 (Fish Oil)
- Turmeric Extract
- Cherry Juice

References

- www.examine.com
- www.jissn.com
- www.suppversity.blogspot.com
- www.omega-research.com

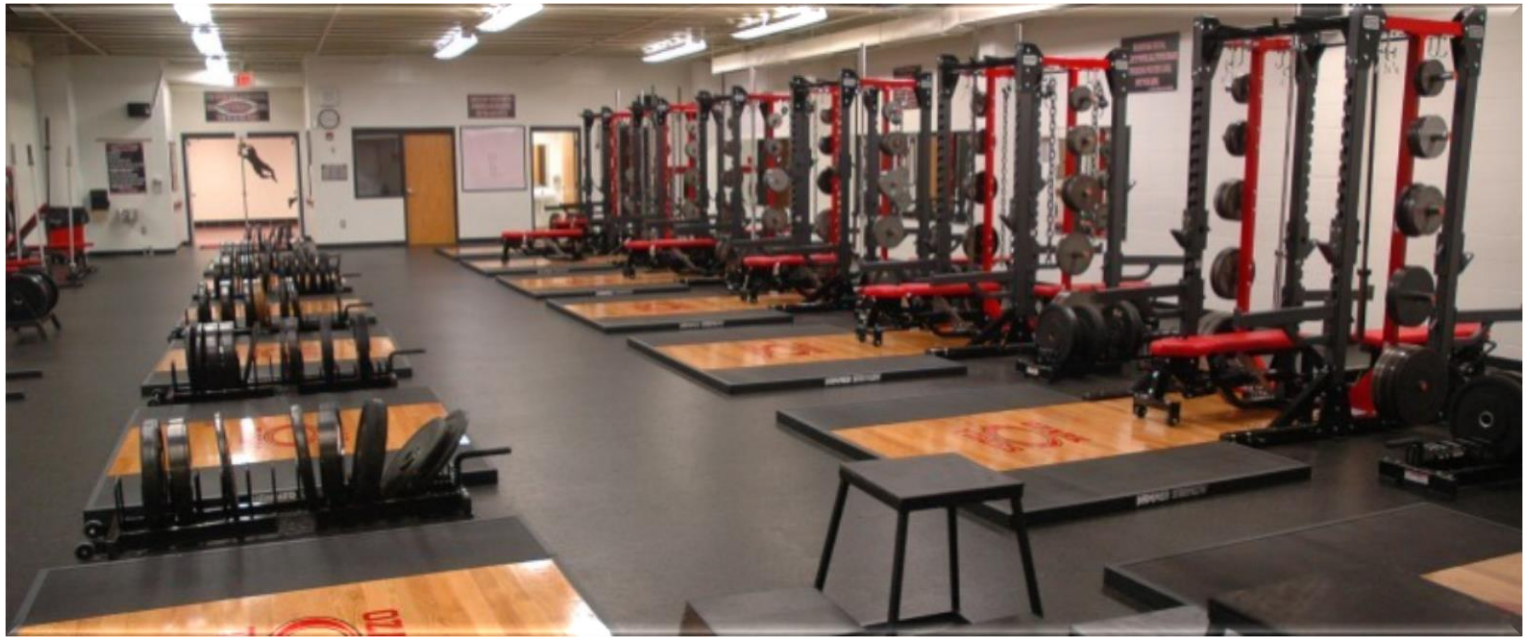
3rd Party Certification

- Recognized by MLB, MLBPA, NFL, NFLPA, Canadian Centre for Ethics in Sports, PGA, and LPGA
- Screen for 270+ substances banned by most organizations
- Offer their NSF Certified for Sport Program

Nutrition: The Missing Link to Peak Performance

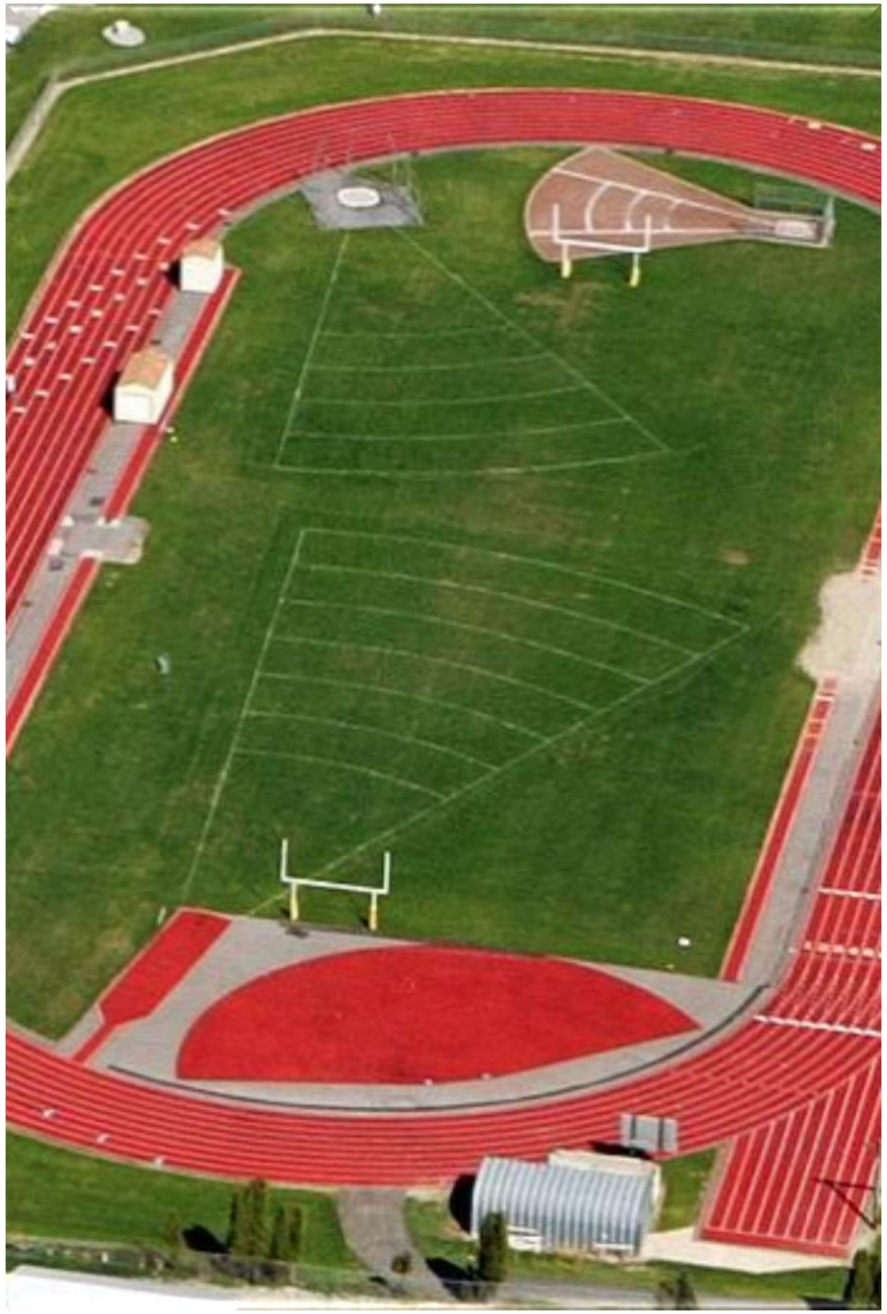
Changes in Youth Sports and the

What is Happening in Youth Sports?



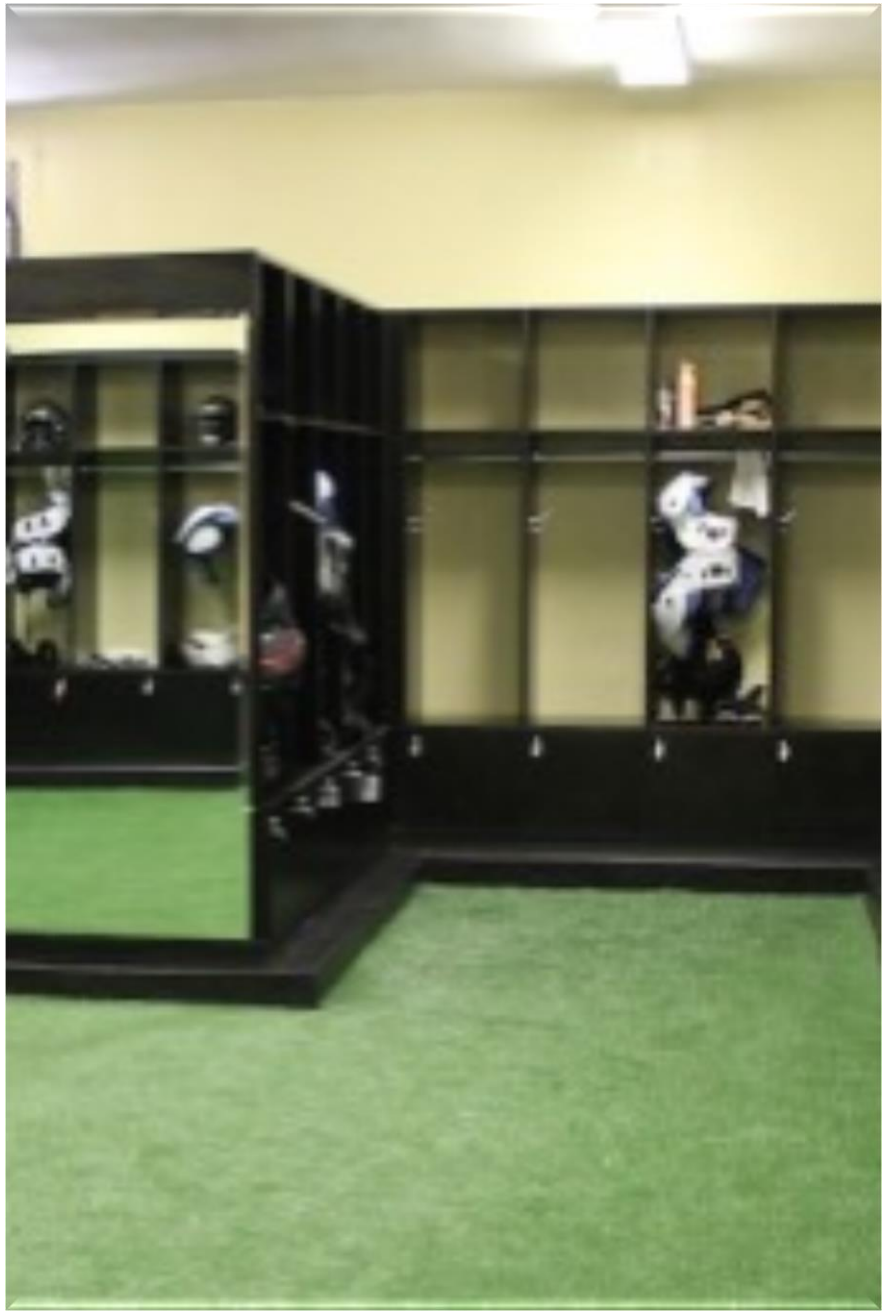
Bigger and Better Weight Rooms

Improved Strength and Conditioning Programs



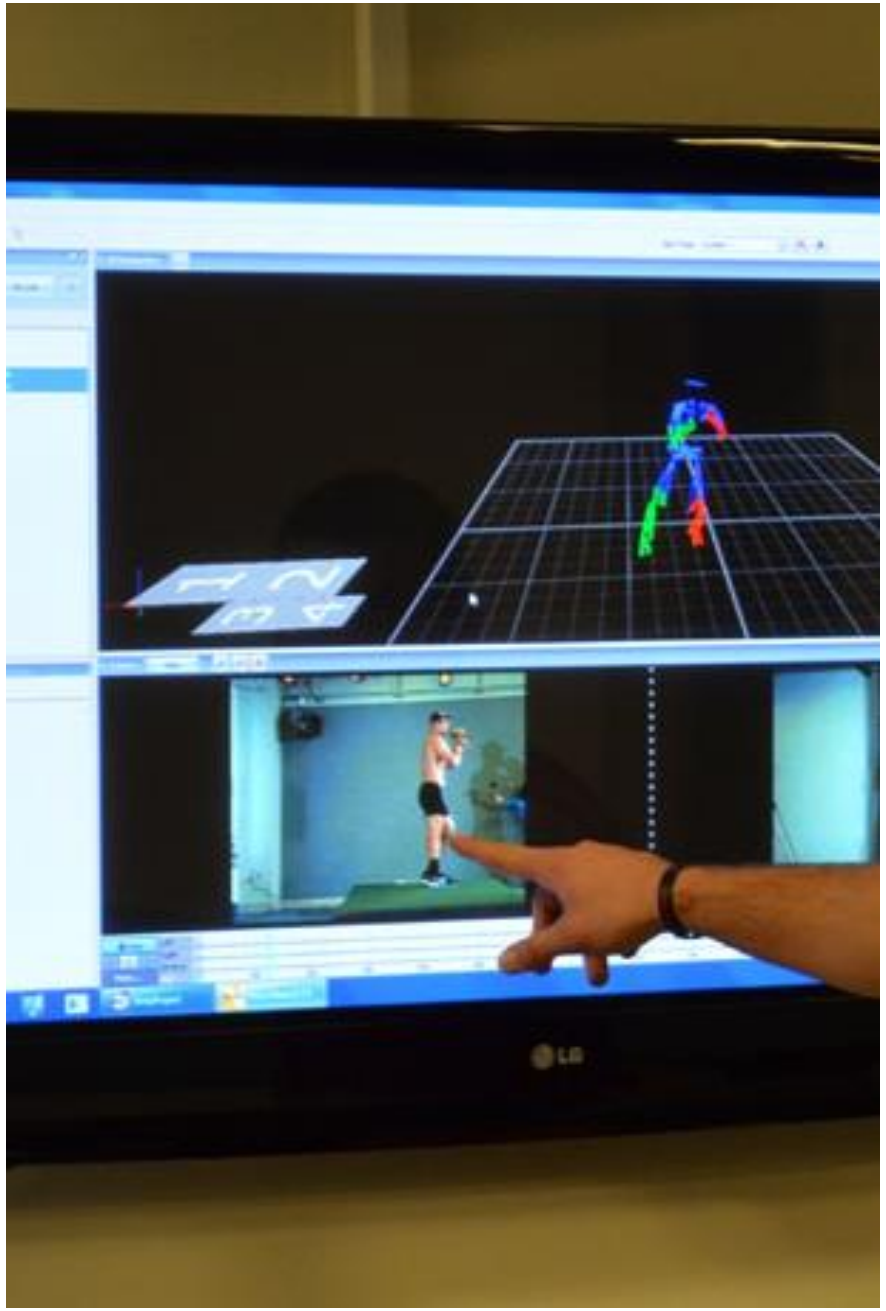
Larger Stadium and Event Venues

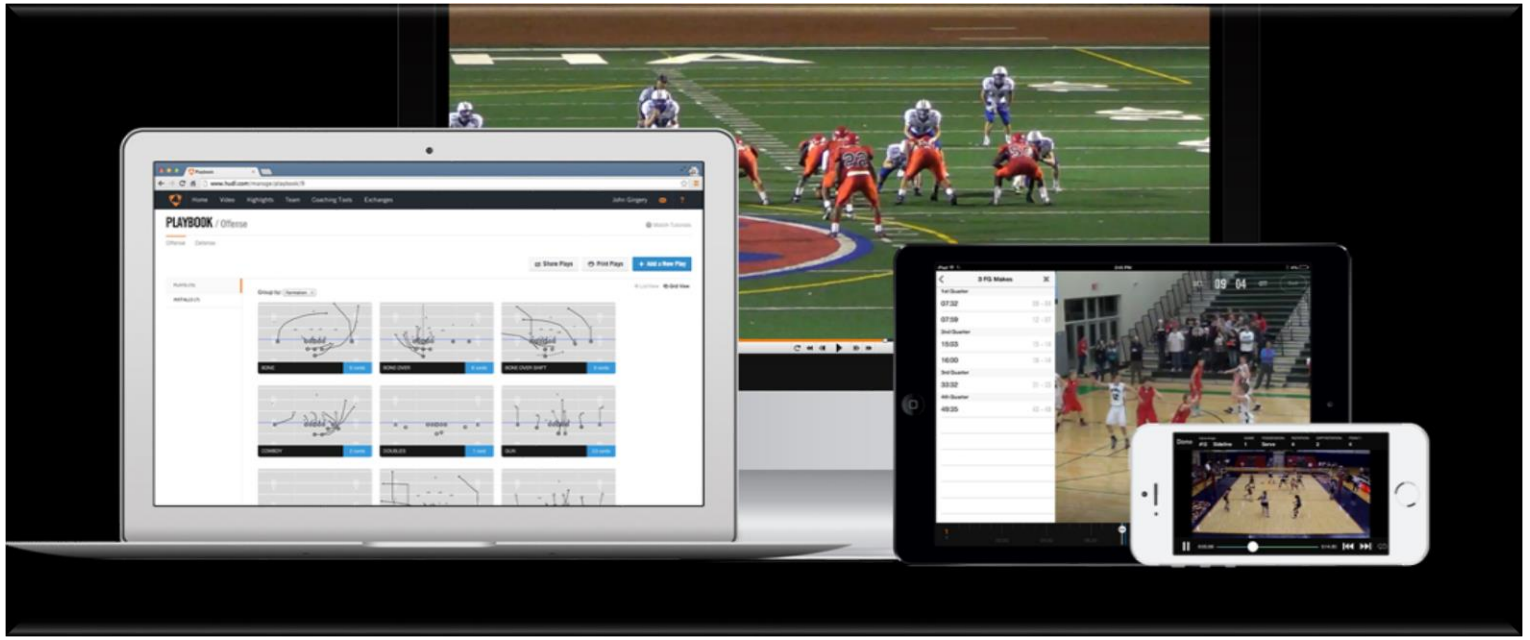
Improved
Sports Medicine Facilities
(Athletic Training Room) & Staffing



Improved Locker Rooms

More
Sports Science Research





Much Improved Technology Tools

Top Quality Equipment and Uniforms

Better Strategy & Skill Development

Is **Sports Nutrition** the Elephant in the Room?

“Good Eating Habits can Make a Good Athlete Great”

“Bad Eating Habits can Make a Great Athlete Good”

In your opinion,

Out of 100% what is the importance of each for athletes to achieve their maximum athletic performance?

Strength & Conditioning (SC)

+

Skill Development (SD)

+

Sports Nutrition (SN)

_____ %

_

_____ %

_

_____ %

_

In your opinion,

Out of 100% what % of **time** and/or **money** do you focus on for each?

Why? How Much?

Strength & Conditioning (SC)

\+

Skill Development (SD)

\+

Sports Nutrition (SN)

_____ %

_

_____ %

_

_____ %

_

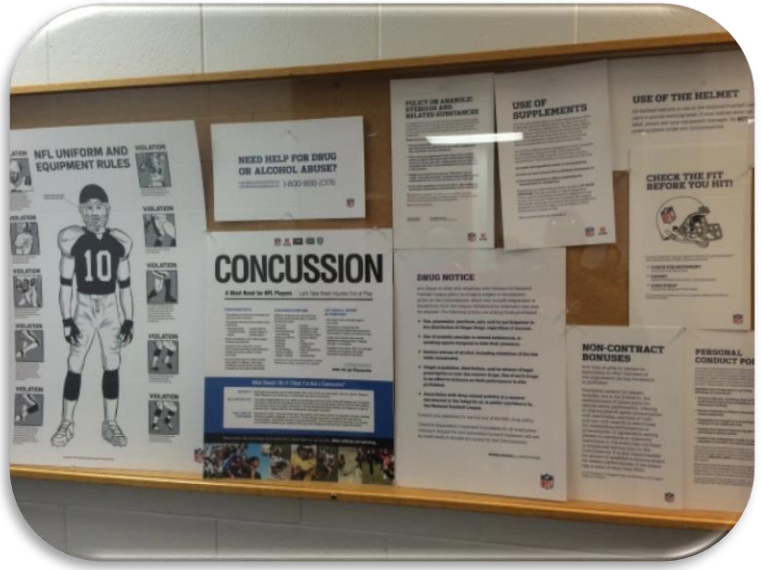
Common Sports Nutrition Resources or Influences

- Guest Speaker
- Posters in Locker Room
- Handouts
- Internet
- Social Media
- Locker Room Talk

What else have you used to try to improve an athlete's eating habits?

Common Sports Nutrition Resources or Influences

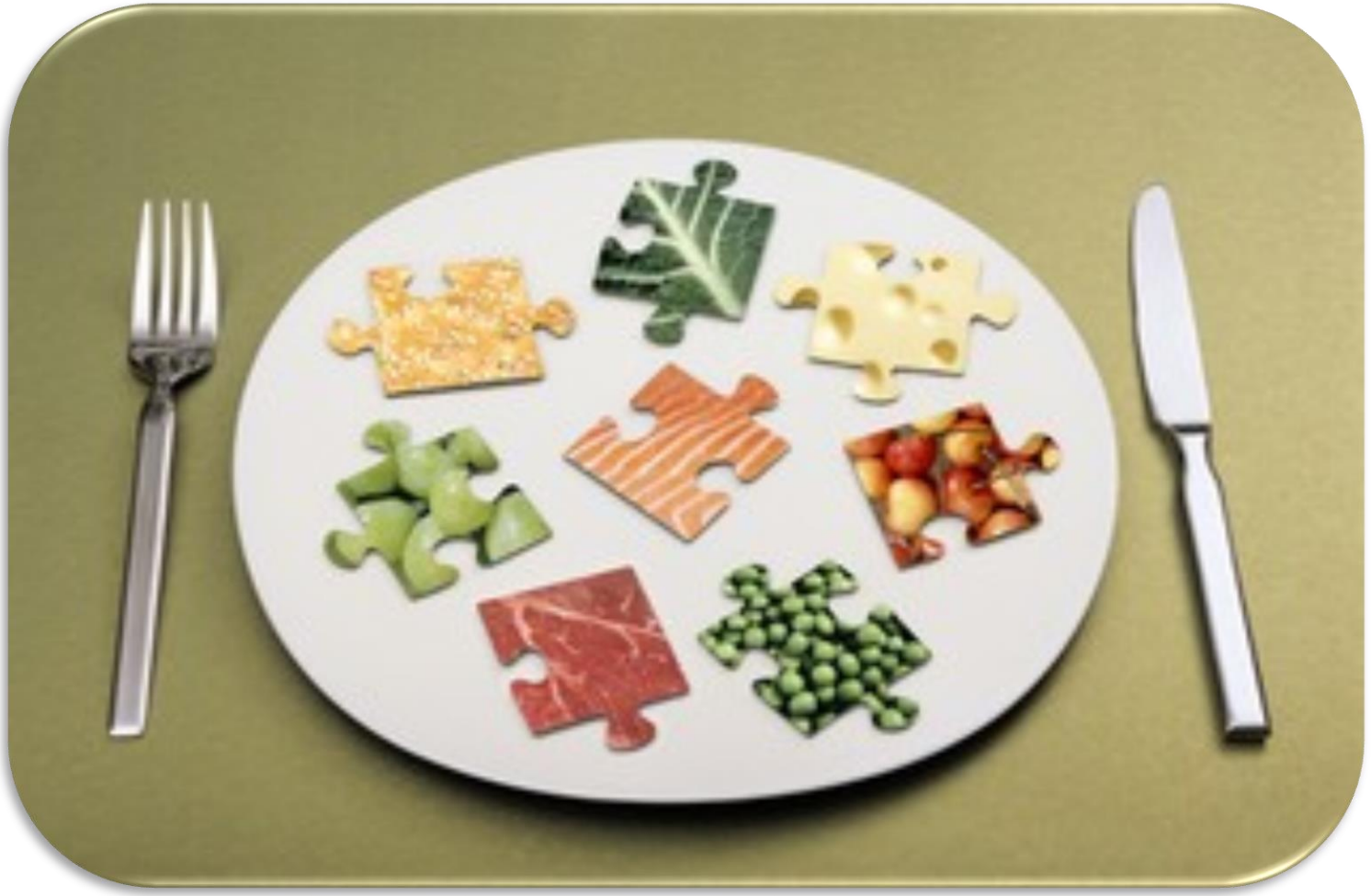
- Which can be trusted?
- Can you measure its effectiveness?
- How much money or time was spent on the plan?
- Did it actually improve an athlete's eating habits?



Growth takes place best if planted in Good Soil?

True or False?

Gaining Weight for Athletes can be a Complicated Puzzle



Most Challenging Pieces of the Weight Gain Puzzle?

When should I eat?

Not Eating Breakfast

School Rules

Bad Supplement Decisions

Picky Eater

Dinner/Snack Choices

Having a PLAN?

NO Extra Food Served on Campus

Doing way too much activity

Actual vs. Perceived Eating Habits of High School Students

- 256 HS athletes (3 schools) surveyed on eating habits
  - Students Rating of their Eating Habits 86% (B)
  - Eating Habits as Rated by a Sports Dietitian 65% (F)

86% of HS students thought they ate well, but did not

Reference: *My Sports Dietitian*

Top Lessons Learned in Solving this Puzzle

#1 Parent who buys and cooks the food has to know and understand the **PLAN** and stay in the loop.

Top 10 Lessons Learned in Solving this Puzzle

#2 Athlete needs to bring additional food to school.

Top 10 Lessons Learned in Solving this Puzzle

#3 Athlete has to want to invest in their nutrition when provided a **practical plan** on how to improve.

Top 10 Lessons Learned in Solving this Puzzle

#4 Only the m**otivated athletes** will have success and invest the time needed to reach their body weight goals

Top 10 Lessons Learned in Solving this Puzzle

#5 Work around **school rules if needed** to consume calories and hydrate during the school day.

Top 10 Lessons Learned in Solving this Puzzle

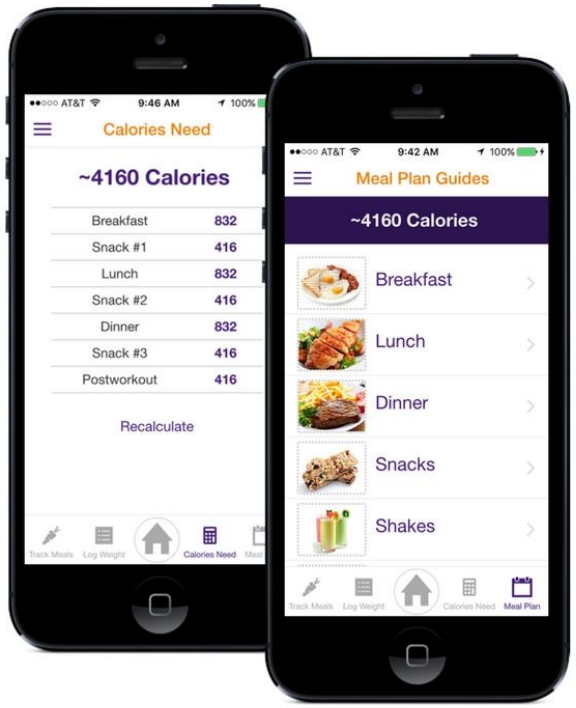
#6 Focus on **short term** goals. Establish patterns and habits first!

Top 10 Lessons Learned in Solving this Puzzle

#7 Body weight or body composition changes should not be overemphasized as **measurements for success**.

Top 10 Lessons Learned in Solving this Puzzle

#8 Utilize **technology tools** as appropriate.



All eyes are on mobile….

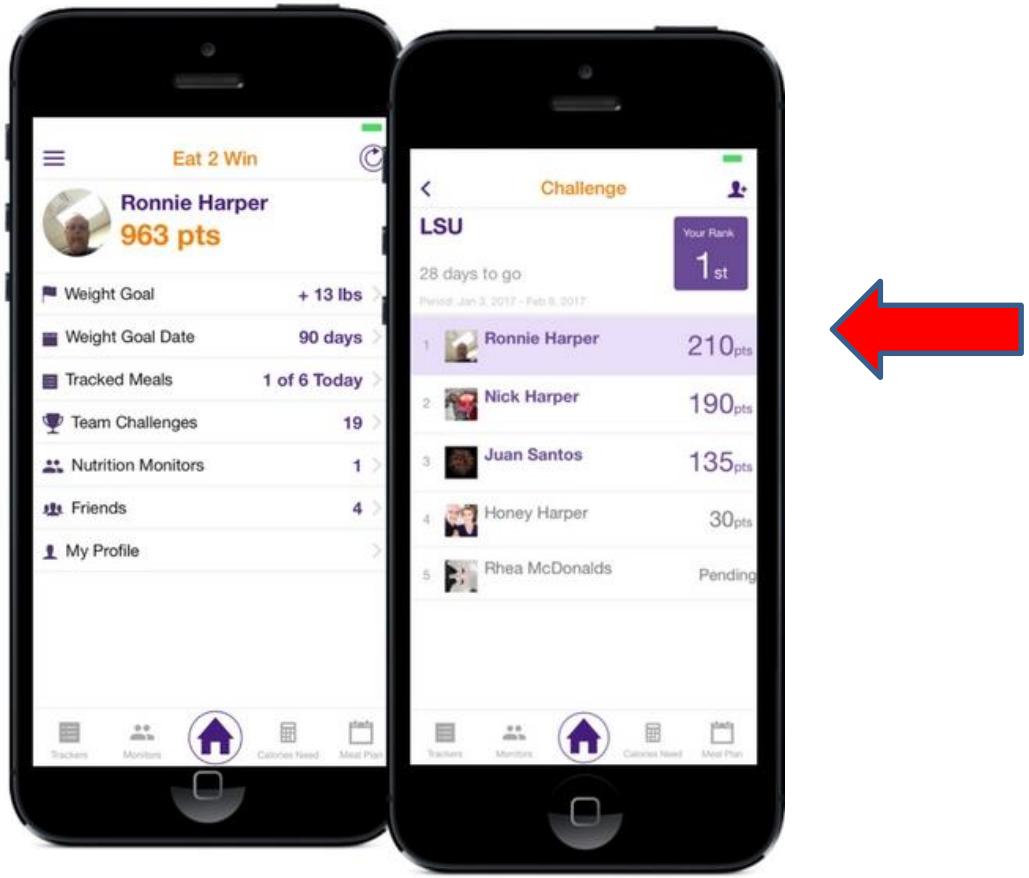
Eat 2 Win Nutrition

Top 10 Lessons Learned in Solving this Puzzle

#9 Use **competition** when implementing a sports nutrition program. Athletes love to compete!

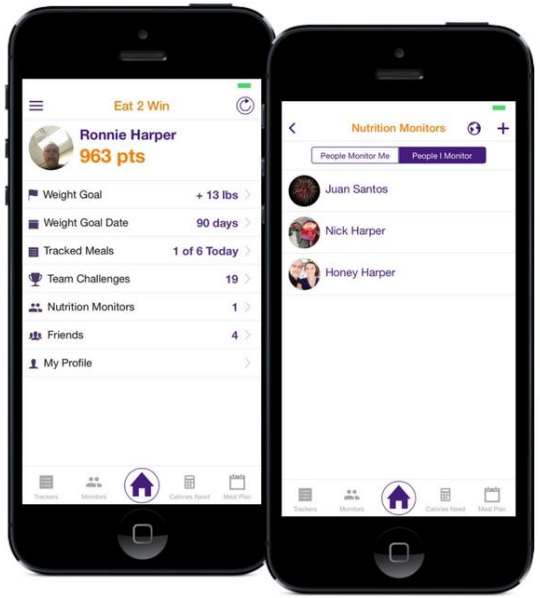
Eat 2 Win Nutrition

Create and Compete in Challenges



Top 10 Lessons Learned in Solving this Puzzle

#10 All influential people (Parents, Coach, Athletic Trainer, Dietitian, Strength & Conditioning Coach…) need to know **the plan** and work together.

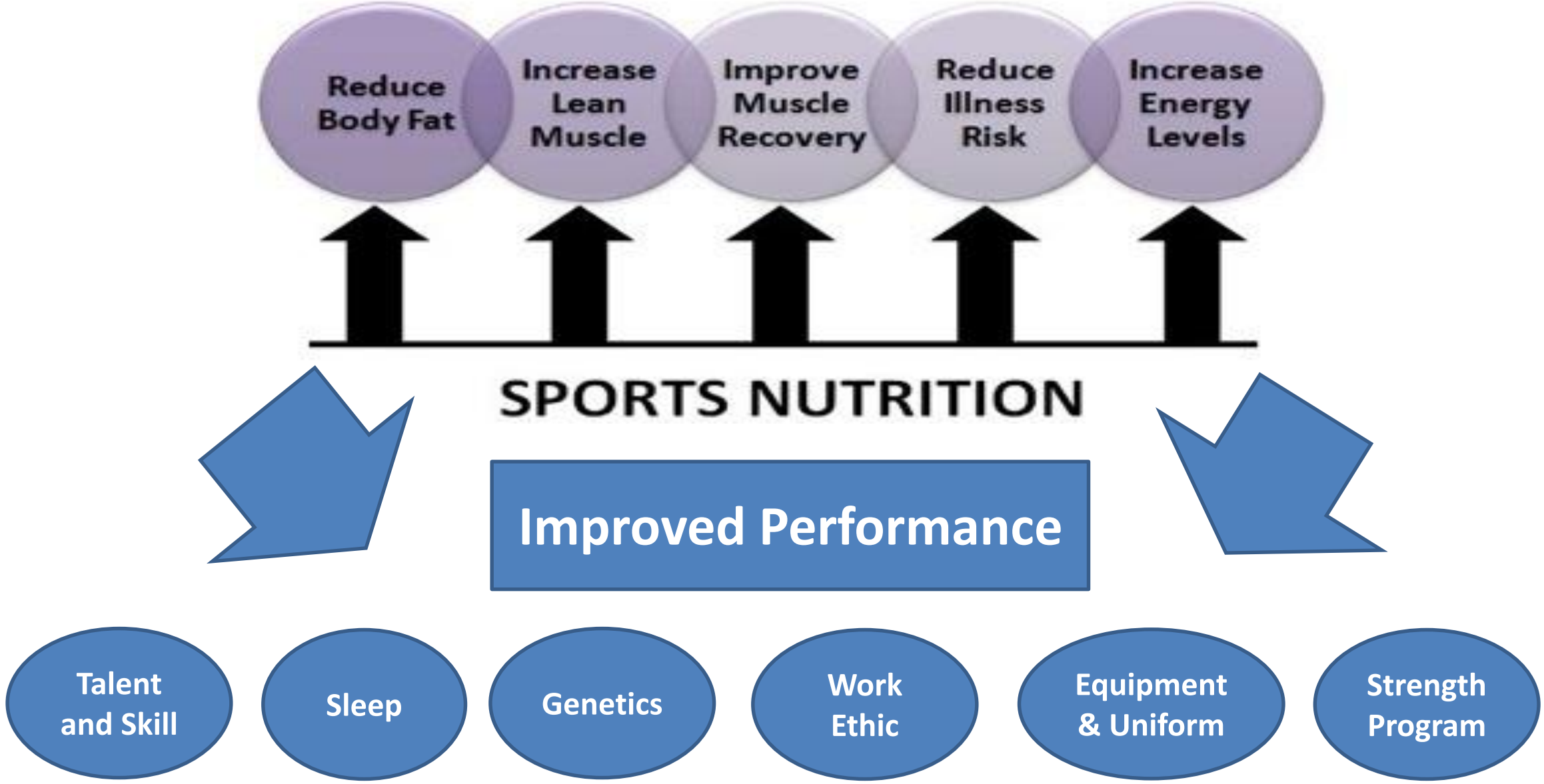


Add a Nutrition Monitor

Invest in Your Foundation

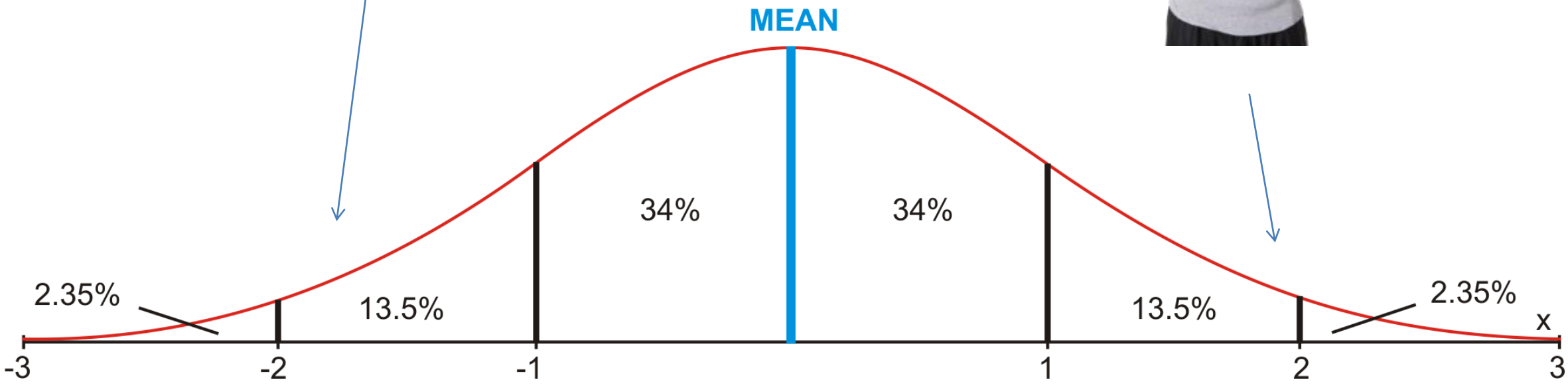
- **Athletes spend lots of time on:**
  - Learning the playbook
  - Practicing and Training
  - Individual and Position Specific work
- **Coaches and Parents spend time and money on:**
  - Equipment & Uniforms
  - Strength and Conditioning
  - Teaching and Coaching

- **How much time do we invest in providing quality <u>FUEL</u> in the body to optimize performance, health, and recovery?**


Reduce Body Fat
Increase Lean Muscle
Improve Muscle Recovery
Reduce Illness Risk
Increase Energy Levels
SPORTS NUTRITION
Improved Performance
Talent and Skill
Sleep
Genetics
Work Ethic
Equipment & Uniform
Strength Program

So What to Do?

How do you improve the eating habits of athletes?



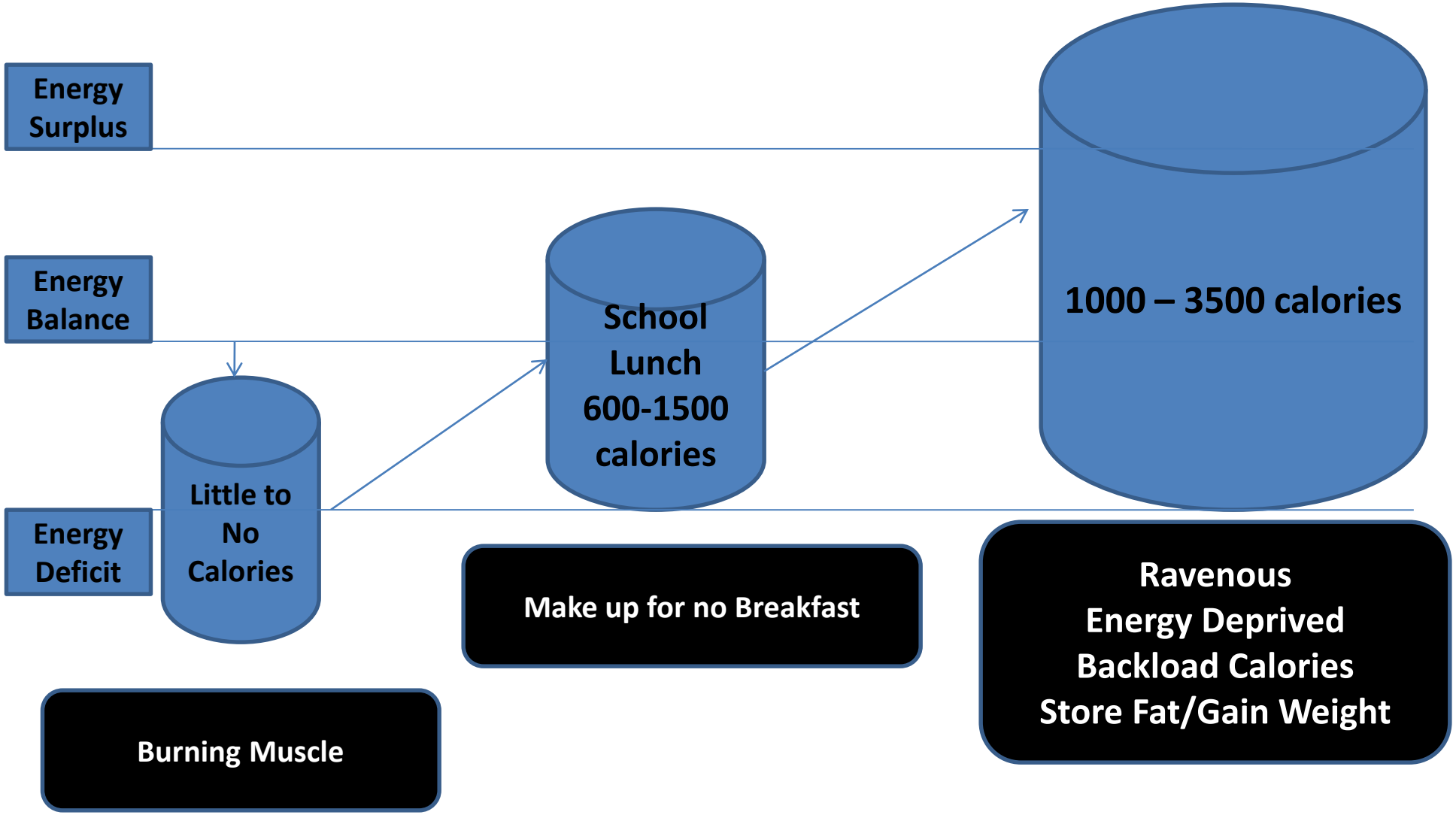
Majority of Young Athletes are Simply **Under Fueled** Especially During the Season

General Nutrition Strategies

- **Meal Timing for Adequate Calories**
  - Quality Breakfast is essential
  - Must Bring Calorie Dense Meals/Snacks to School
  - Adequate and quality Carbohydrates
- **Eat for your Immune System to survive**
- **Critical to have a Nutrition Plan**
  - **How to accomplish #1**

Eat 2 Win Nutrition

Current Eating Patterns of Most Athletes

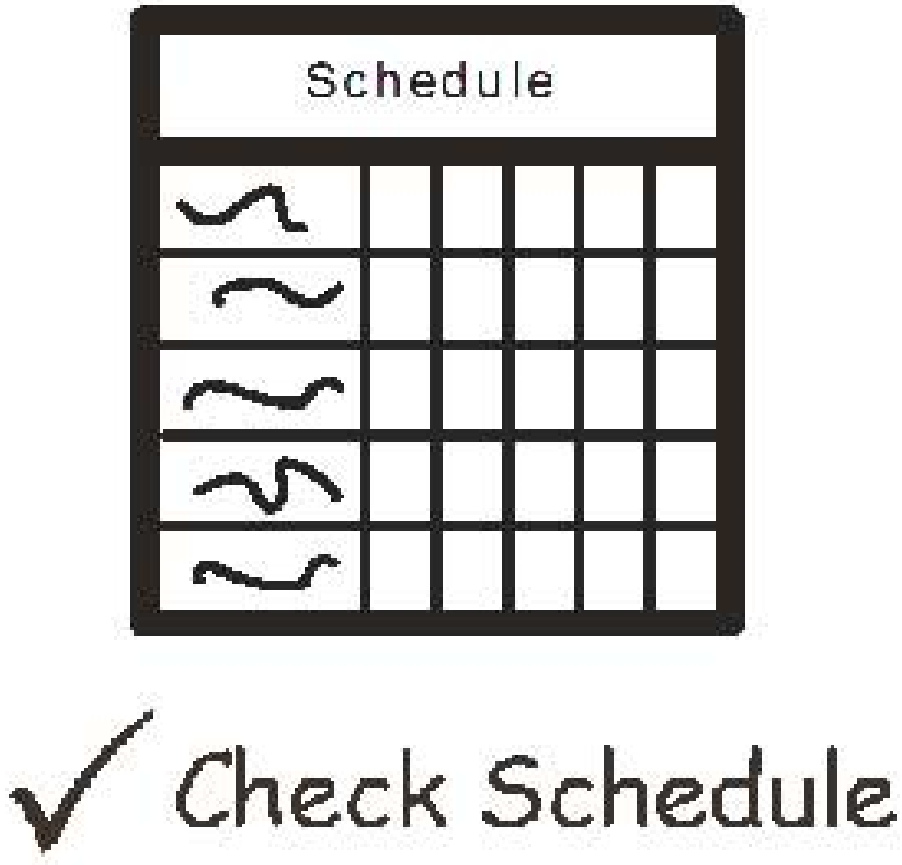


Step 1: Meal Timing
Most Critical and Challenging Habit

Meal Timing Challenges

- Class Schedule
- Workout Schedule
- Practice Schedule
- Social Schedule
- Studying Schedule

- **Where does eating fit?**



Benefits of Meal Timing

3 Meals + 3 Snacks

- Improved strength and power
- Improved body composition
- **Sustainable Energy**
- Better blood sugar control
- Improved hunger control

Never over-ate or under-ate

3 Meals

- Increased body fat
- Lower energy levels
- Poor Blood Sugar Control
- Increased hunger due to large gaps

Over-ate at all 3 meals

Deutz RC, Benardot D, Martin DE, and Cody MM. Med Sci Sports Exer. 2000.

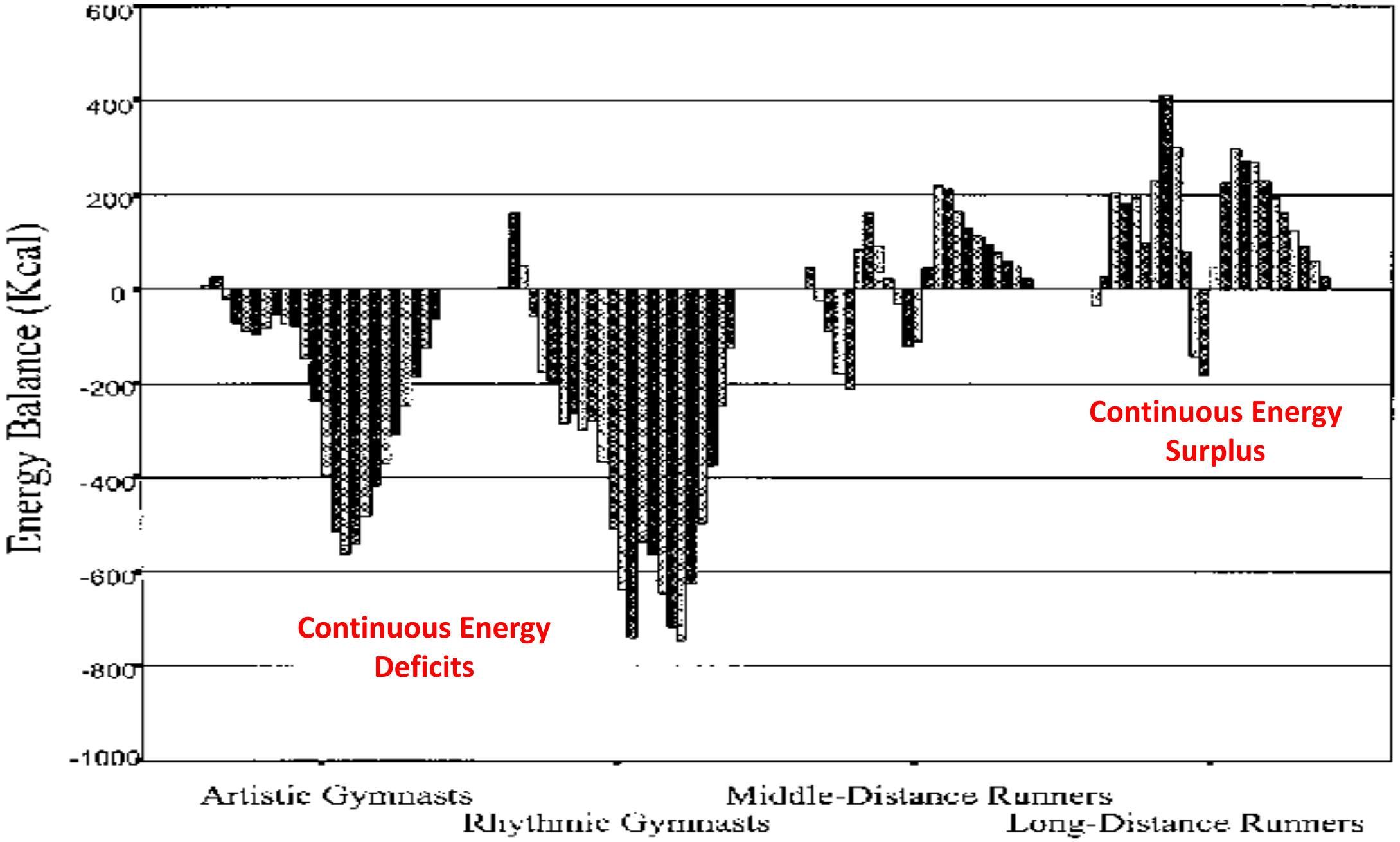


Figure 1—Comparison of within-day energy balance in four groups of

Sample Eating Schedule for Athletes

Breakfast
6:30 or 7:00 am

Snack
9:00 or 10:00 am

Lunch
11:30 -12:30 pm

Pre-Practice Snack
2:30 or 3:00 pm

Protein/Carb Fluids
Post Workout Snack

Dinner
6:30-7:30 pm

Snack
9:00 or 9:30 pm

→ **Class**
7:30-11:00 am

→ **12:00-3:00 pm**
Class

→ **3:00-6:00 pm**
Practice
Lifting

Eat **4 Times before Practice**

School, lifting, and practice schedules will vary by school

Breakfast Every Morning

- **What's the #1 Excuse of why HS Athletes don't eat Breakfast?**
  - I don't have time
  - **Fact: They want to sleep later**

Breakfast Every Morning

- **Why is it so critical?**
  - Body is coming off the longest fasting period (8-16 hours of no food)
  - Creates a further energy deficit if not consumed
  - Frequent prolonged deficits burn muscle for energy
  - Athlete will eat more calories later at night
  - Missing out on necessary calories at a critical time

No time for breakfast?

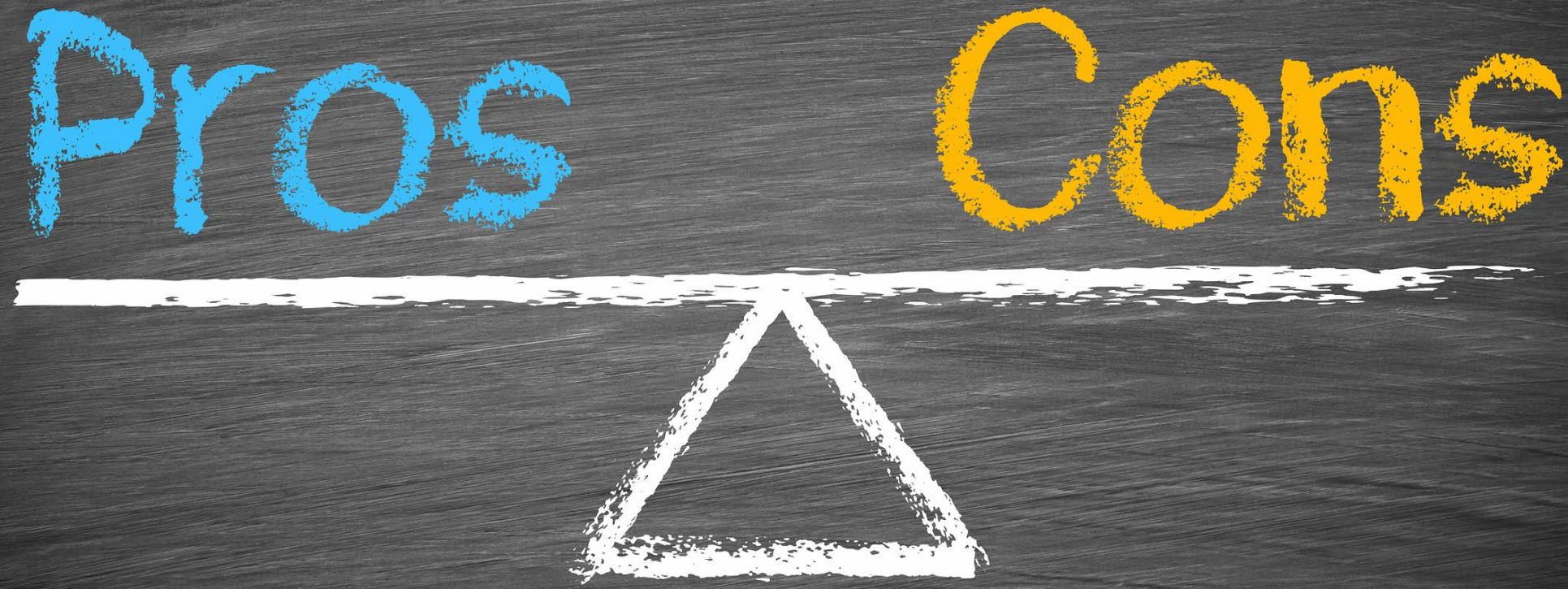
Breakfast Every Morning

- **How to solve the athlete's challenges?**
  - **Create a simple convenient way to eat a balanced meal**
    - 3-5 minute breakfast meal
  - **Non-Breakfast Eaters**
    - Body hasn't had calories in quite some time so there's no hunger signal present
  - **What if I have an early Training Session (6 or 7 am)**
    - Try liquid calories (i.e. Smoothie)
    - During workout nutrition fuel
    - Immediate post workout nutrition fuel/recovery

Convenient Breakfast Options

- **Solid only**
  - 2-4 Eggs, 2 slices toast with 2 tbsp. PB, 1 cup Milk
- **Solid plus liquid**
  - 2 Whole Grain Waffles with 2 tbsp. Peanut Butter, 1 scoop Protein Power with Milk and Banana
- **Liquid Only (Smoothie)**
  - 1-2 scoops Protein Powder
  - 1-2 cups Milk (depends on goals)
  - 1 cup or piece of fruit (berries or banana)
  - 2 tbsp. Peanut Butter or ¼ cup cashews or walnu
  - 1 cup spinach (doesn't affect flavor profile)

Bring Food to School: Critical for Athletes



Bring Extra Food to Campus

- **Benefits**
  - Sustained energy
  - Increased muscle:fat ratio
  - Fuels afternoon practice
  - Reduced meal consumption at night
  - Increases calorie intake

Bring Food to School

Challenges of School Lunch

- May not like choices offered at school (poor quality)
- School lunch is too low in calories for athletes (High School lunch) – still hungry – can't reach goals
- **Limited time to eat (i.e. 30 minutes)**
- Don't like the taste of school lunch
- Can't bring own food from home (Private HS)
- On a limited budget

Calorie Dense Snacks

Food/Meal	Calories
PB and Jelly Sandwich or Uncrustable	**350-400 calories**
1 cup of Trail Mix	**650-700 calories**
1/2 cup of Mixed Nuts +	**800 calories**
RTD Ensure Plus (8 oz) + ½ PB & J Sandwich	**600 calories**
PB and Honey Banana Sandwich	**500 calories**
Bagel with Peanut Butter and Jelly	**600-700 calories**
½ Turkey Sandwich + 1/2 cup Trail Mix	**600-700 calories**
Nutrition Bar (250-300 cals) + ½ cup Mix Nuts	**500-600 calories**
2 scoops higher calorie powder with water and ½ sandwich	**500 calories**
*Cereal Bars	200 calories
*Bag of Chips	150-200 calories
*Candy Bar	200-300 calories

Takes 2-3 minutes to eat

**** Vending Machine Options from School***

Quality Carbohydrates

- **Key fuel to optimize athletic performance**
- **Quality carbs for sustainable energy**
- **Every low carb or ketogenic study on exercise performance had demonstrated a decrease**
- **Produce less power and ATP on lower carbohydrate diets**
- **Difference is in quality vs what most of our young athletes are eating today**

Quality Carbohydrates

State Championship Carbs

80-85% of carbohydrate intake

Rice
Fruit
Pasta
Beans
Corn
Peas
Bread
Oatmeal
Quinoa
Potatoes
WG Cereal
Sweet Potatoes

Miss the Playoff Carbs

15% of carbohydrate intake

Sodas
Pies
Cakes
Candy
Cookies
Pastries
Donuts
Cereal Bars
Honey Buns
Potato Drinks
Sugary Drinks (i.e. Punch)

Eat for your Immune System

Omega 6 Rich Foods

- Western diet has an abundance of Omega 6 rich foods
- Pro-Inflammatory as diet is around 20:1 Omega 6:Omega 3
- Biggest Culprits are Vegetable Oils (Safflower) & Soybean Oil
  - Fried foods
  - Regular Mayo
  - Potato Chips
  - Salad Dressings
  - Baked goods
  - Processed Foods
  - Fast Food

7-10 servings of Fruits/Veggies

- Reduces inflammation (i.e. swelling of tissue)
- Reduces muscle soreness
- Immune system boost for hard training
  - Get sick less often (i.e. infection, cold, flu)
  - Especially critical for year round athletes
- High Antioxidants fight infections/illness
- Faster healing of injuries
- **High Alkalinity balances Acid load from Meat and Starch rich foods**
  - Critical for Bone Growth and Strength
  - Critical for Muscle Strength


THREE
PROTEIN
BRONCOS
TWO
CARBOHYDRATES
BRONCOS
ONE
FRUITS, VEGETABLES
NUTS & SEEDS
MINIMIZE DOWNTIME DUE TO ILLNESS
CHOOSE DIFFERENT FOODS WITH MANY COLORS
ADD NUTS AND SEEDS TO CEREAL AND SALADS
BRONCOS

ONE

FRUITS, VEGETABLES, NUTS & SEEDS

MINIMIZE DOWNTIME DUE TO ILLNESS

CHOOSE DIFFERENT FOODS WITH MANY COLORS

ADD NUTS AND SEEDS TO CEREAL AND SALADS

ONE

FRUITS, VEGETABLES, NUTS & SEEDS

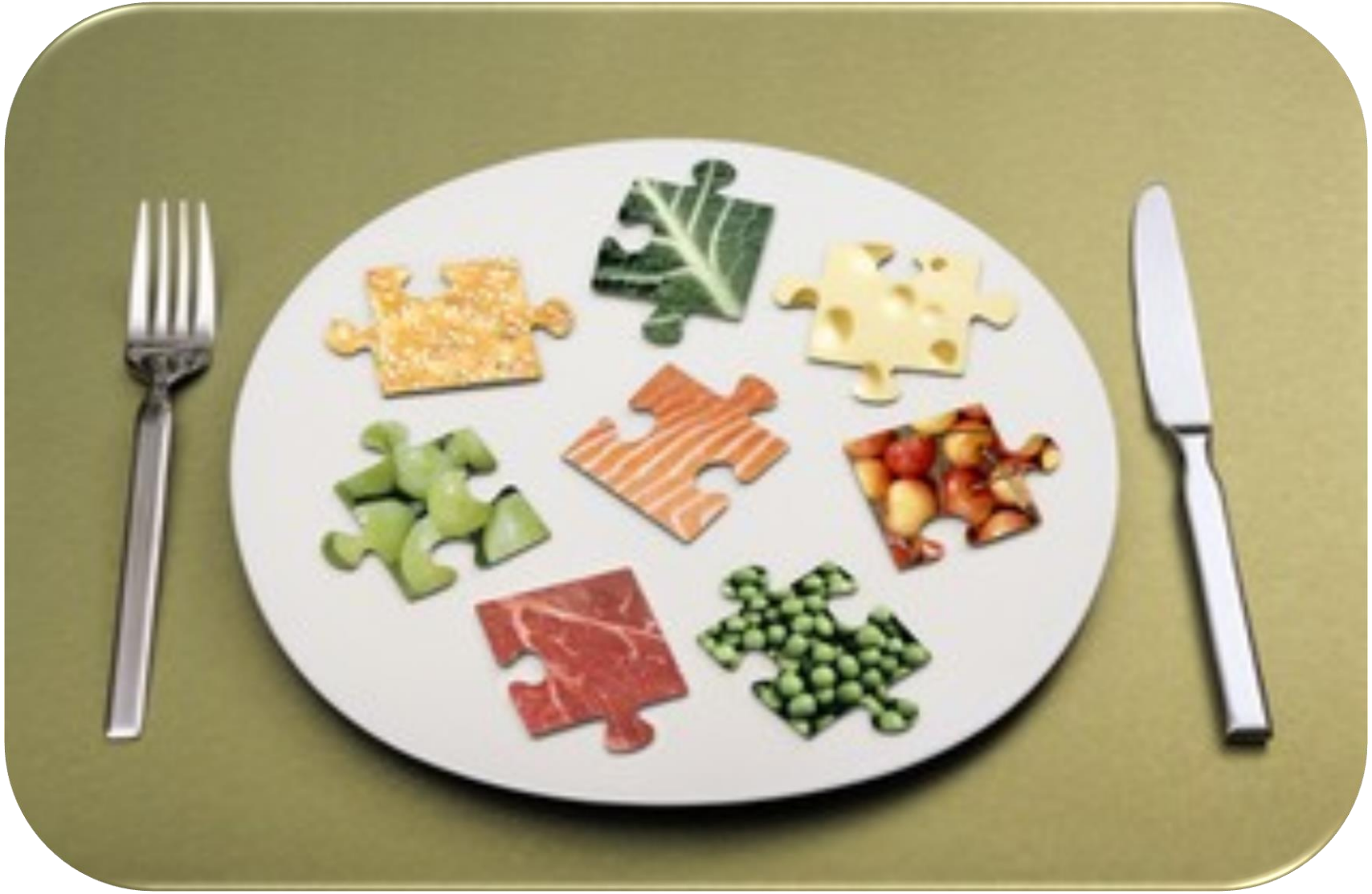
MINIMIZE DOWNTIME DUE TO ILLNESS

CHOOSE DIFFERENT FOODS WITH MANY COLORS

ADD NUTS AND SEEDS TO CEREAL AND SALADS


1
FRUITS, VEGETABLES, NUTS & SEEDS
HEALTHY IMMUNE SYSTEM

The Athlete's Meal: Nutrition Periodization



Nutrient Needs: Weight and Fat Loss

Source: USOC Sports Dietitians

Nutrient Needs: 1 ½ Hours a Day of Training

Nutrient Needs: 2+ Hours a Day of Training

Why Athletes Can’t Gain Weight?

Today's High School Athlete

- Year round activity
- Some are training for 4+ hours per day
  - Practice, Lifting, Specialty Coaches
- ***Limited or no time to eat between activity***
  - School Rules and lack of time
- Trying to **gain for Football** while also playing summer Basketball
- Trying to **gain for Football** after dropping weight for Wrestling
  - Puts stress on metabolic system with yo-yo dieting
- Sleep late on weekends
  - Miss out on important calories needed to build muscle

Today's High School Athlete

Athlete Example #1 **6'5** **180 lbs** **17 years old**

Basketball Forward and Football DE

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Lifting	8-10 am		8-10 am		8-10 am		
Condition		8-9:30 a		8-9:30 a			
FB Pract	5-7 pm		5-7 pm				
BB Game						3 games	2 games
BB Pract		6-8 pm		6-8 pm			

16 hours of Running > 6 hours of Lifting

Today's HS Athlete

Athlete Example #1 **6'3 150 lbs** **15 years old**

Baseball Pitcher and First Baseman

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
School Lifting	9-10:30		9-10:30		9-10:30		
PT Workout	1-2 pm		1-2 pm		1-2 pm		
Pitching Coach		12-1 pm		12-1 pm			
BB Game		5-7 pm		5-7 pm		2-3 games	2 games
BB Pract	4:30-6:30		4:30-6:30		4:30-6:30		
Hitting Coach	7-8 pm						
Total Work	5 ½ hrs	3 hrs	4 ½ hrs	3 hrs	4 ½ hrs	5-6 hrs	4 hrs

30+ hours per week of movement (No rest days)

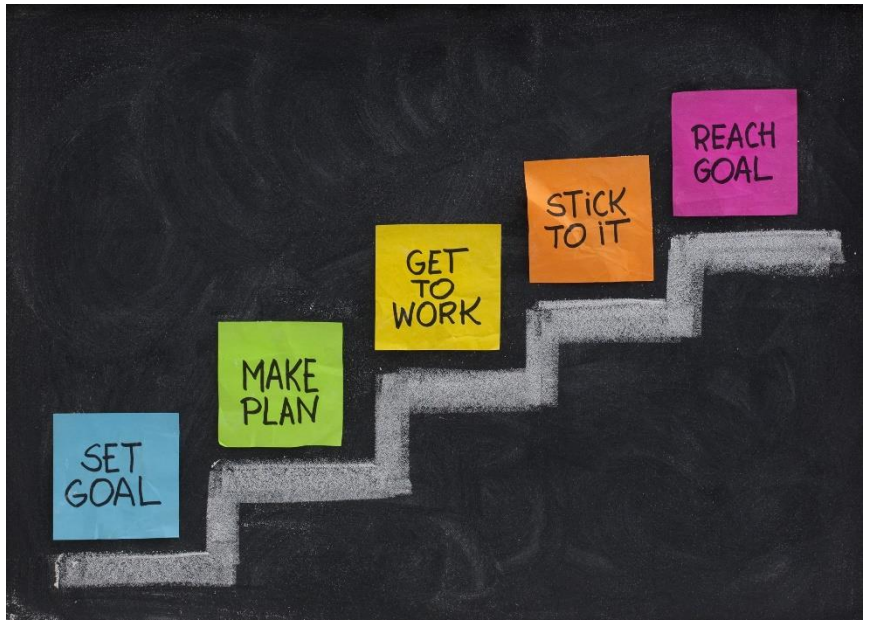
Have A Nutrition Plan To Be Successful

Eat 2 Win Nutrition

Developing a Plan-Athletes

- #1 reason not meeting body weight goals – NO PLAN
- **Advanced Meal Preparation is a game changer**
    - Make 15-20 PB and J sandwiches
    - 20 bags of mixed nuts in a ziplock bag
    - Portion out leftovers in food containers
    - **Take ownership of preparing snacks and lunch**
    - Make breakfast or set out the night before if you want to sleep later
    - Pack snacks for road trips, tournament, or multiple matches

Set Goals & Develop a Plan



- **Set Goals (short term)**
  - Eat Breakfast every morning
  - Bring Snacks to School
  - Eliminate sodas for hydration
  - Minimize Fast Food consumption
- **Set Goals (long term)**
  - More Energy
  - 1 RM Bench, Squat, and Power Clean improved >15-20% after 12 weeks
- **Find 1-2 weaknesses to fix to see significant changes**

Athlete Case Study

- October 2014
- Age: 16
- Ht: 6’5
- Wt: 170 lbs
- Body Fat: 11%
  - Muscle: 151 lbs
  - Fat: 19 lbs

Sport: Baseball Pitcher

- **Eating Habits**
- **7:00 am Low Calorie Breakfast**
- **12:00 pm – School Lunch**
- 3-5:30 – Baseball Practice
- 6-7:00 pm Lifting workout
- **7:00 pm – Large Dinner**

Case Study – Meal Changes

- 6:45 Increased Breakfast
- 9:30 Added a 500 calorie Snack
- 12:00 – Brought lunch to school
- 4:00 pm – Snack during baseball practice
- 7:00 pm Post Lifting Snack
- 7:30 Reduce Calories at Dinner
- 9:30 Shake before bed

Athlete Case Study

- October 2014
- Ht: 6’5
- **Wt: 170 lbs**
- Body Fat: 11%
  - Muscle: 151 lbs
  - Fat: 19 lbs

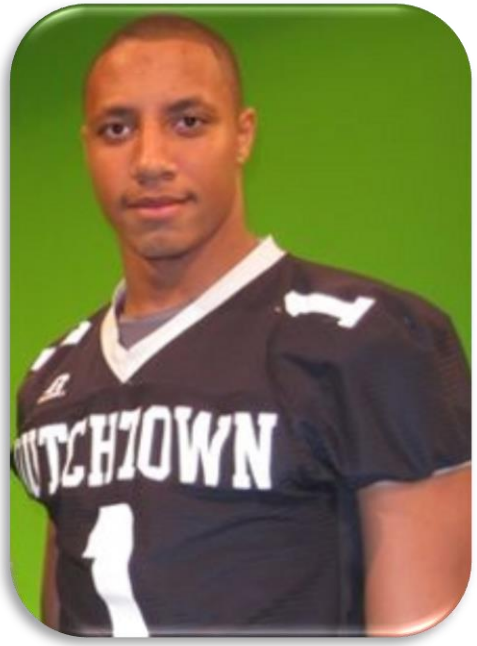
- January 2016
- Ht: 6’6
- **Wt: 235 lbs**
- Body Fat: 9%
  - Muscle: 205 lbs
  - Fat: 20 lbs

***In 15 months Joe gained – 64 lbs of Lean Muscle**
***Fastball went from 83-97 mph**

****Awarded a scholarship to pitch at Vanderbilt**

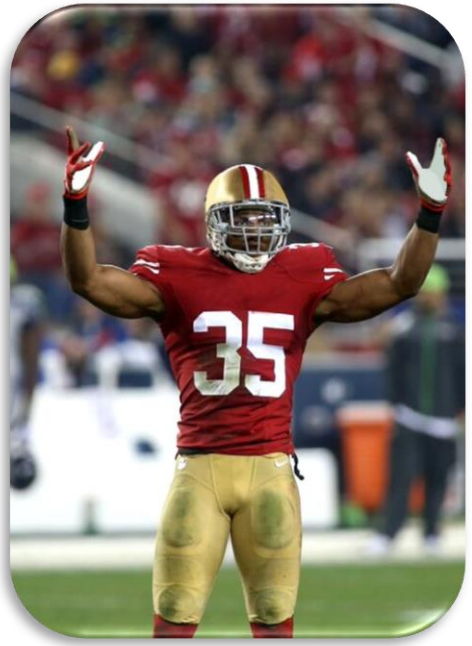
Eric Reid Jr. Story

Junior High School
175 lbs.



Senior High School
200 lbs.

LSU
210 lbs.



49ers
225 lbs.

Bad Eating Habits → **Good Eating Habits**

A Typical Athlete….

Height	6’1”
Weight	175 lbs.
Goal	Gain Weight
Grade	Junior

Meal	**Calories Consumed**	**Calories Needed**
Breakfast	0	840
Snack #1	0	420
Lunch	850 (Regular Lunch)	1075
Snack #2	300 Vending	420
Dinner	1500	1075
Snack #3	400	420
Total	**3050**	**4250**

Eric Reid Jr.

Expected Results……

1st 6 weeks

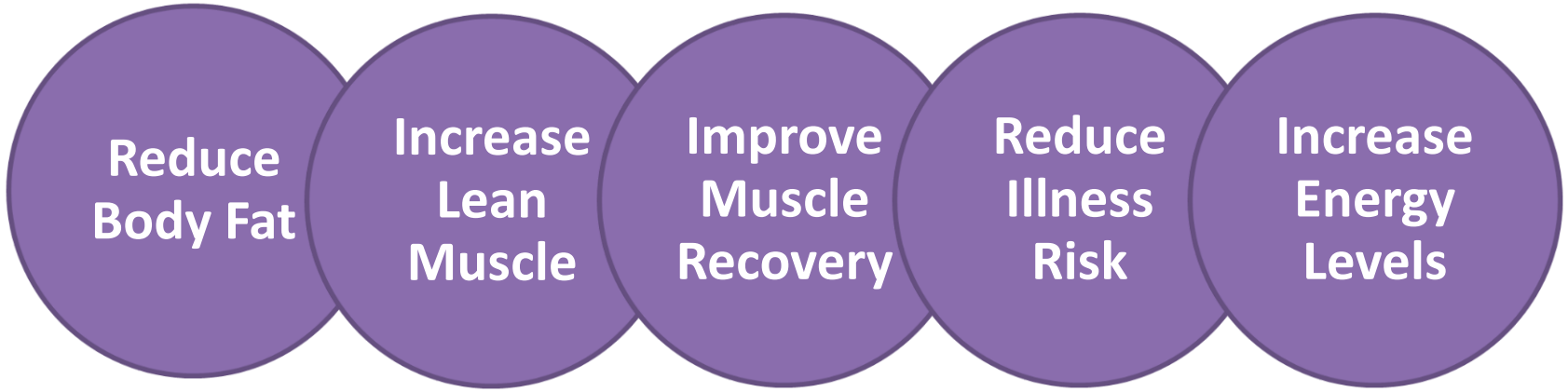
Improvement in energy levels and muscle recovery

2nd 6 weeks

Improvement in strength, body composition and athletic performance

3rd 6 weeks

Develop positive habits while maintaining a high level of energy



Is it Really More Expensive to Eat Healthy?

Wal-Mart
106 servings

$21.22

FOOD	SERVINGS
Boneless Skinless Chicken Breast	12 servings
Eggs	12 servings
Brown Rice	10 servings
Romaine Lettuce	10 servings
Skim Milk	16 servings
Sweet Potatoes	2.5 servings
Yogurt	4 servings
Whole Grain Old Fashioned Oats	30 servings
Black Beans	3.5 servings
Bananas	6 servings
TOTAL SERVINGS	106 servings

FOOD	FAT	CHO	PRO	CAL
Chicken Breasts	30g	0g	240g	1200 kcal
Eggs	54g	12g	72g	840 kcal
Brown Rice	15g	350g	40g	1700 kcal
Romaine Lettuce	1g	15g	6g	78 kcal
Skim Milk	0g	192g	128g	1280 kcal

$20.34

FOOD	SERVINGS
Big Mac	1 serving
Classic Crispy Chicken Sandwich	1 serving
Double Cheeseburger	1 serving
Chicken Caesar Salad	1 serving
Large Coca Cola	1 serving
Large Fry	1 serving
Ketchup Packet	1 serving
Fruit & Maple Oatmeal	1 serving
TOTAL SERVINGS	8 servings

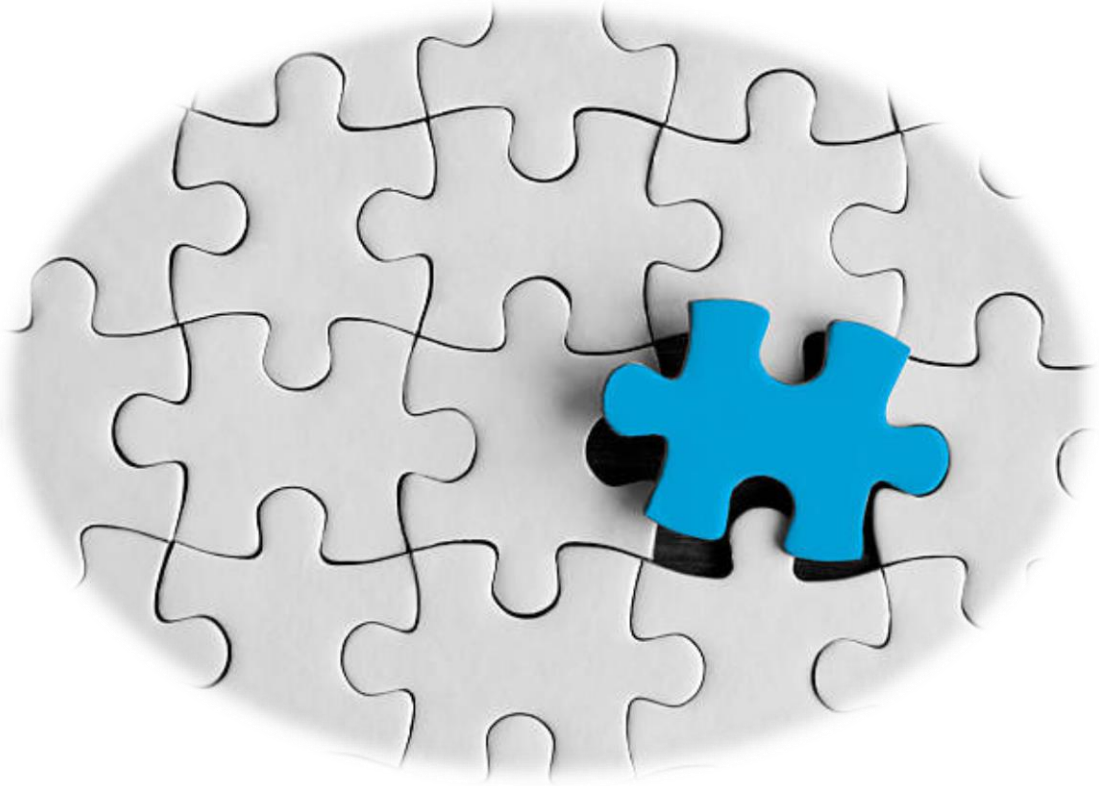
FOOD	FAT	CHO	PRO	CAL
Big Mac	29g	39g	44g	770 kcal
Chicken Sandwich	22g	56g	24g	510 kcal
Double Cheeseburger	23g	34g	25g	440 kcal
Caesar Salad	24g	14g	29g	380 kcal
Large Coca Cola	0g	86g	0g	310 kcal

McDonald's
8 servings

Let Us Help You Build
A Winning Team Using
the Free Eat2Win
Nutrition App

Eat 2 Win
Nutrition

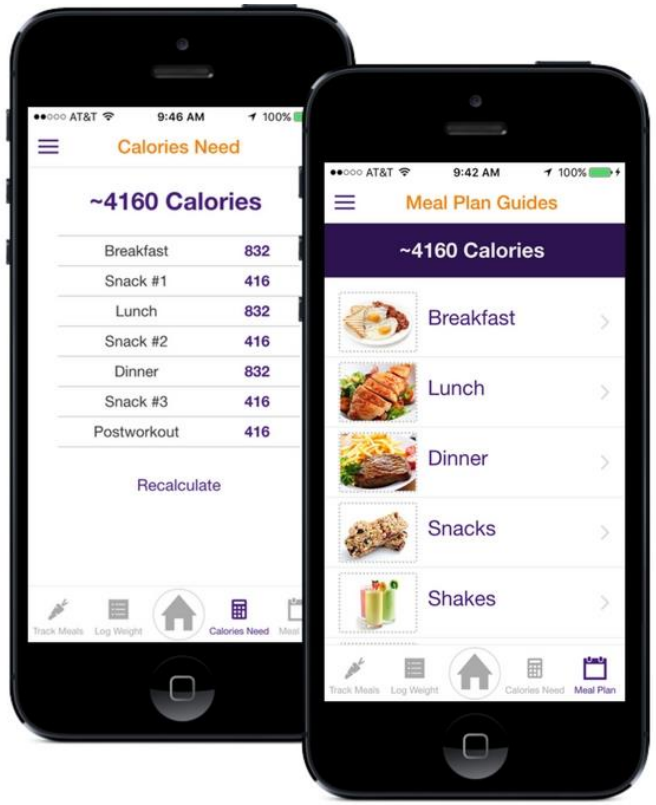
Game Plan



Sports Nutrition Technology

Download Eat 2 Win Nutrition App

Eat 2 Win Nutrition



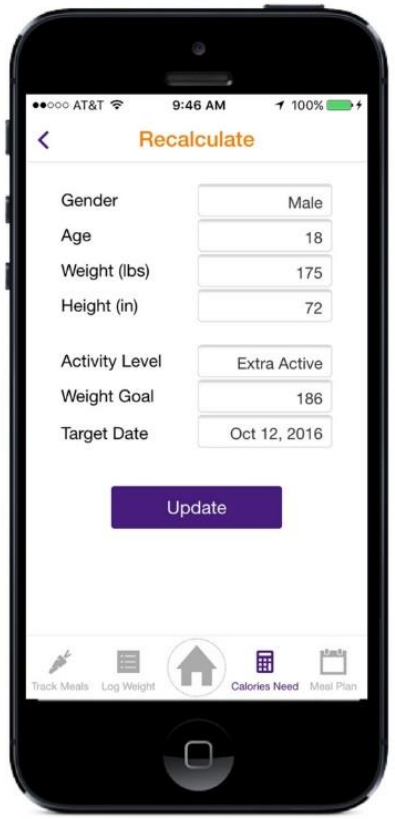
Search: Eat2Win

ANDROID APP ON Google play

Download on the App Store

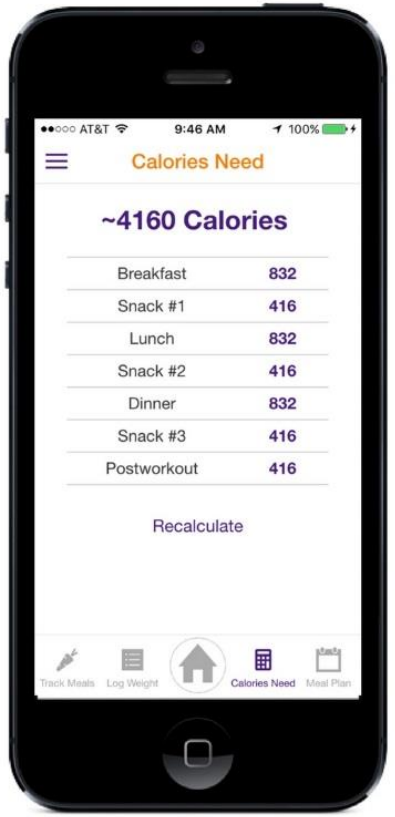
Customized Nutrition Planning

Create Account and Calculate Caloric Needs



Athlete Calorie Calculator

Calculate your caloric needs and set your weight management goal.



Reminders…. Body Weight Management Goal with Parent Input

- Set short term goals (1-3weeks)
- Calculator will limit to 1.5% gain or loss of current weight per week
- Parent input with young athletes
- Seek health care provider advice if needed
- Don’t over emphasize weight gain/loss as sole measurement of success

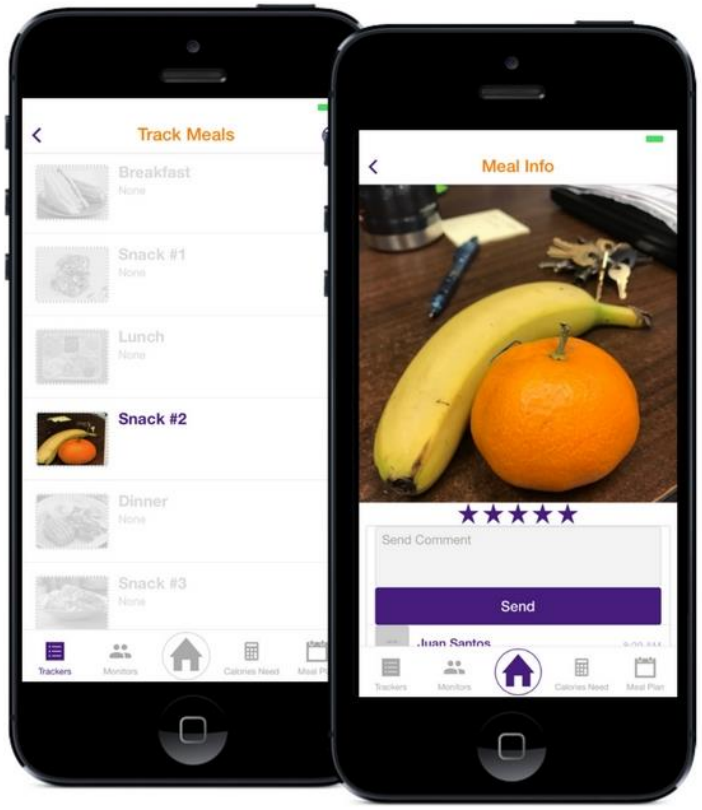
Trackers

Begin Tracking and Scoring Points!

- ✓ Meals
- ✓ Body Weight

Coming Soon

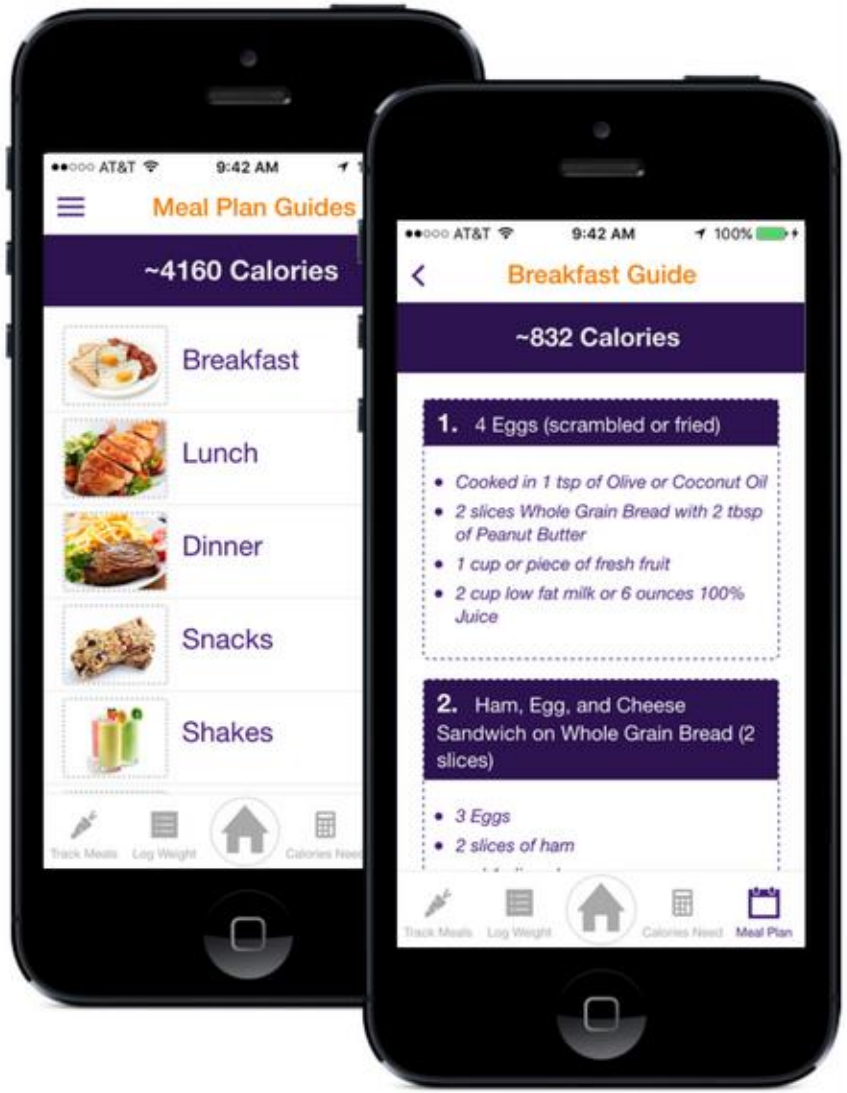
- ✓ Wellness
- ✓ Performance Gains
- ✓ Motivational Quotes/Pictures
- ✓ Fluid Intake
- ✓ Sleep



Eat 2 Win: The Game Plan

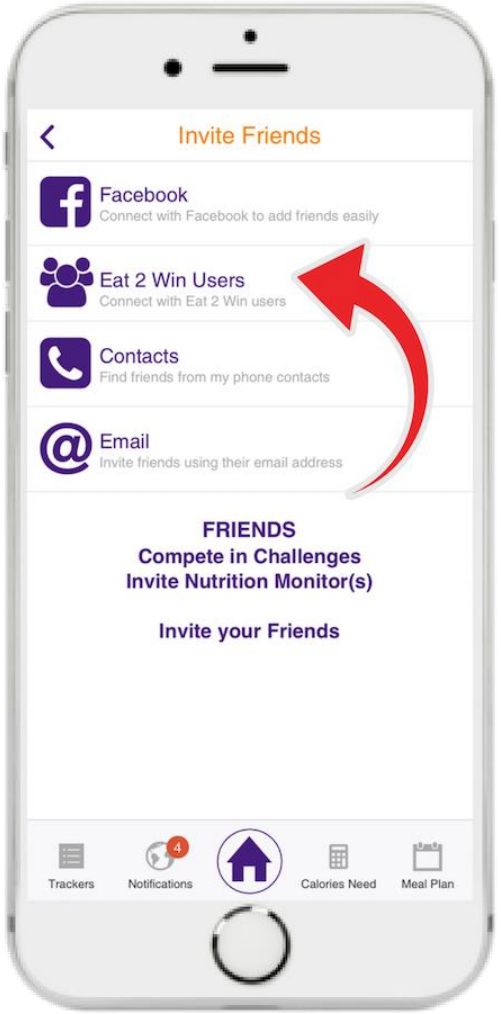
Step #3
Explore Meal Plan Guides

Many examples of meals per caloric needs including Vegan, Vegetarian and Restaurants!

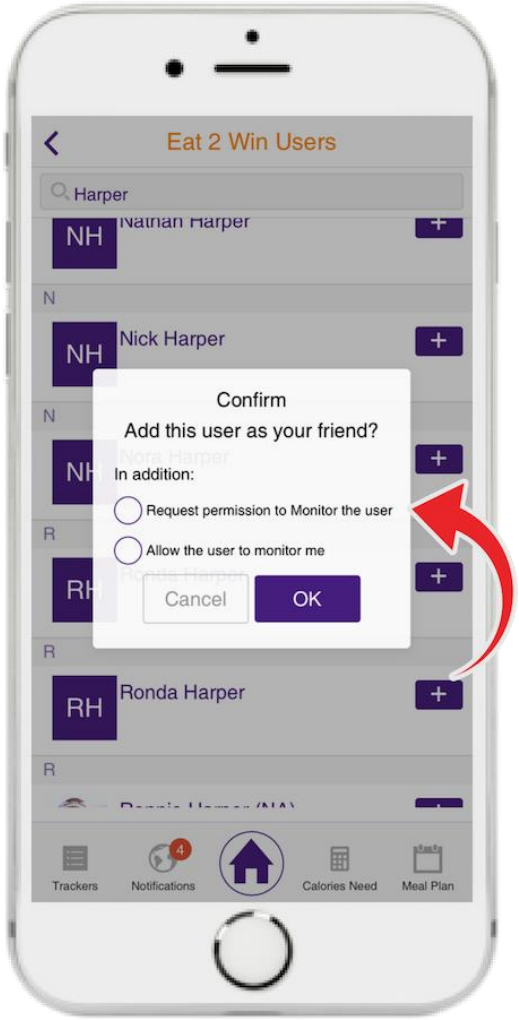


Eat 2 Win: The Game Plan

Step #4
Add Nutrition Monitor(s)



Add Friend then it will prompt for Nutrition Monitor Status



Examples

Sports Dietitian

Athletic Trainer

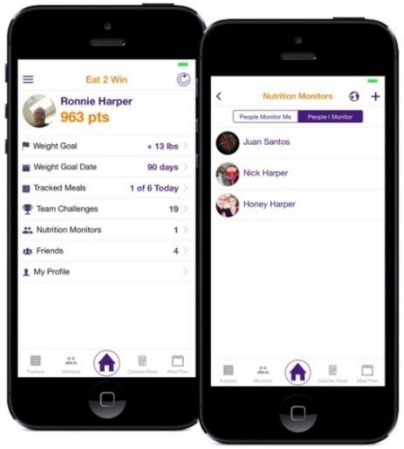
Strength & Conditioning Coach

Educate Athlete on who will be their Nutrition Monitor

Note to Program Administrator:

It works best if the Program Administrators initiates this connection. All the athlete needs to do is accept invite.

Nutrition Monitors



- Nutrition Monitor will See all Comments per Meal
- All Nutrition Monitors are in the Communication Loop
- Goal: Accountability, Feedback & Encouragement

<Insert your Staff Pictures and/or Nutrition Monitors>

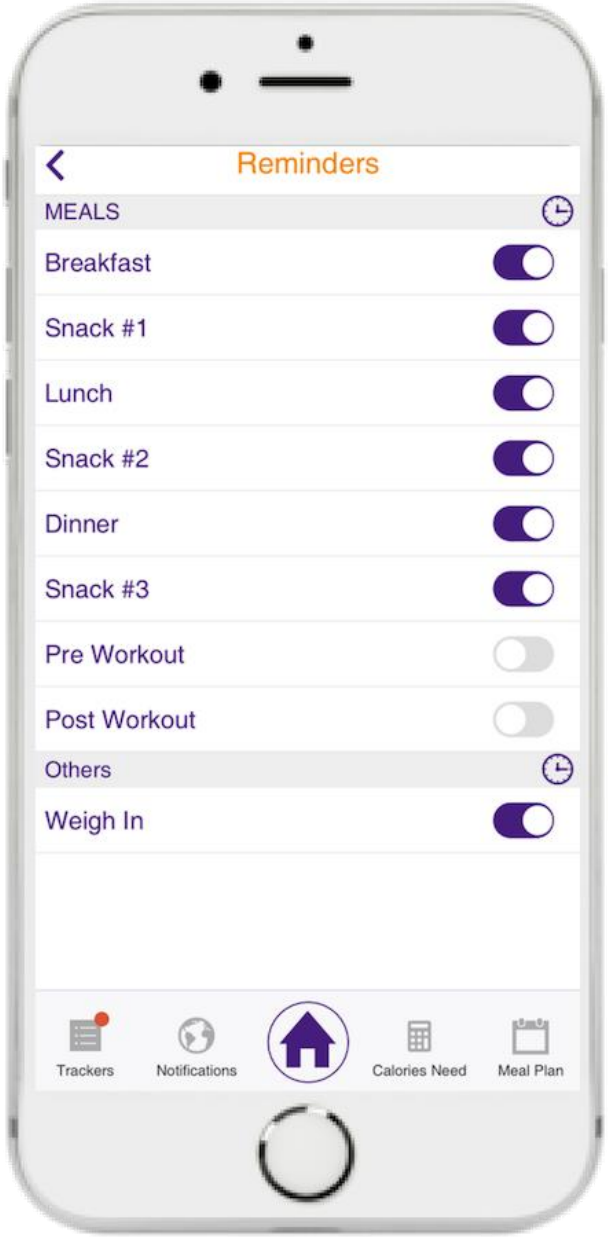
Eat 2 Win: The Game Plan

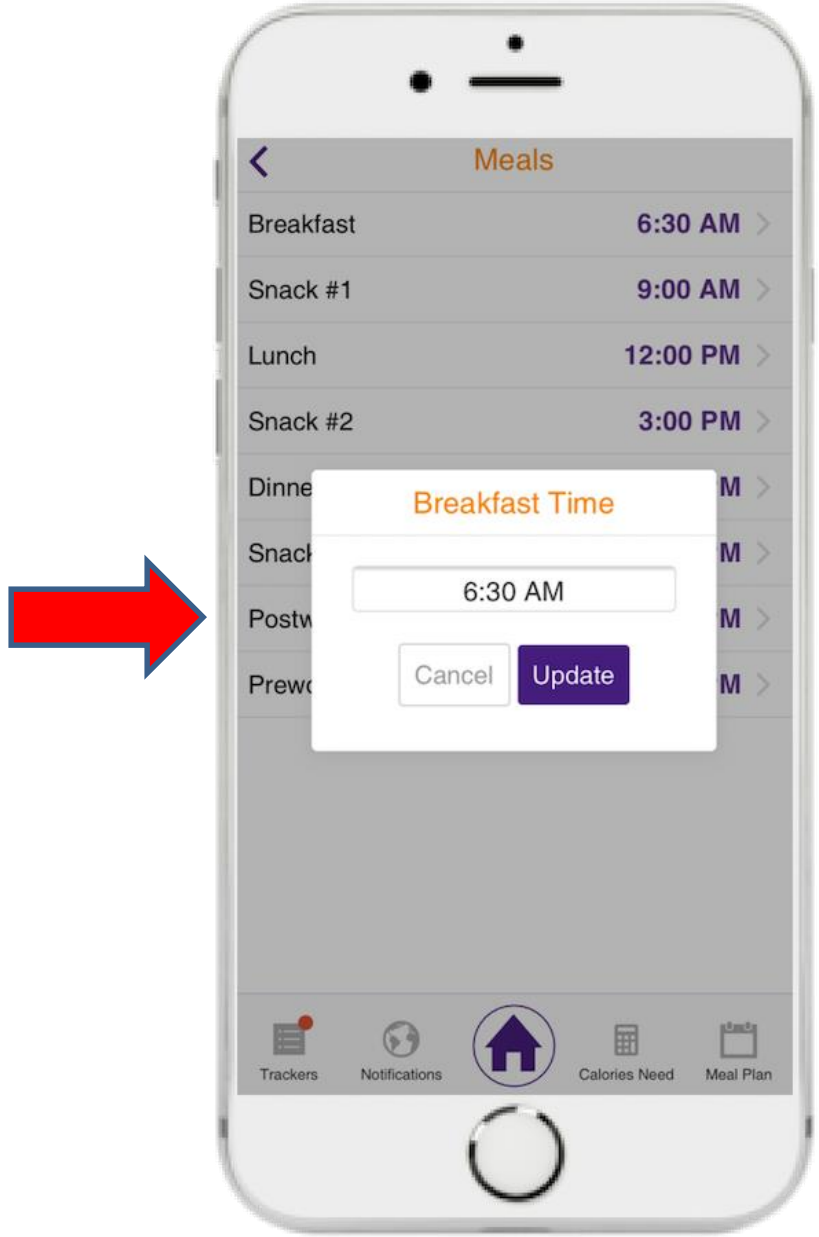
Step #5
Set Reminders

Set your reminders based on your class, workout, and practice schedule.

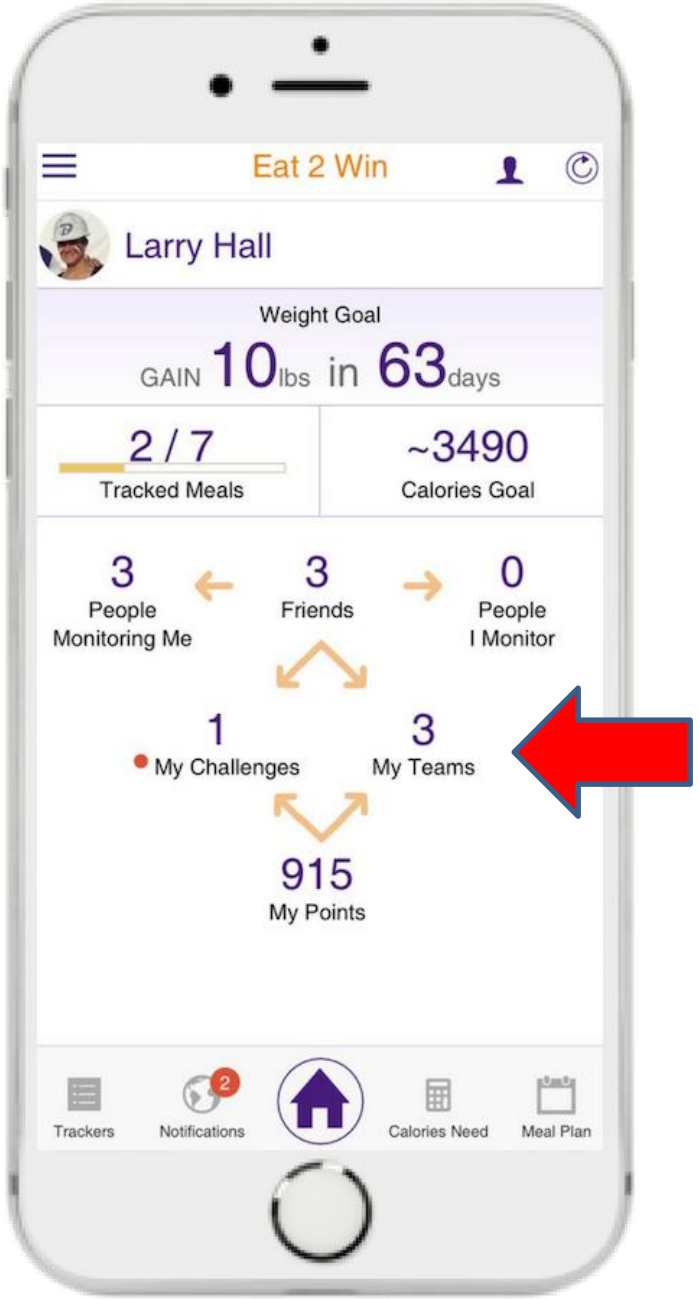
Consult with your Sports Dietitian, <insert name> if any questions.

To Locate Reminders: Menu>Settings





Eat 2 Win: The Game Plan

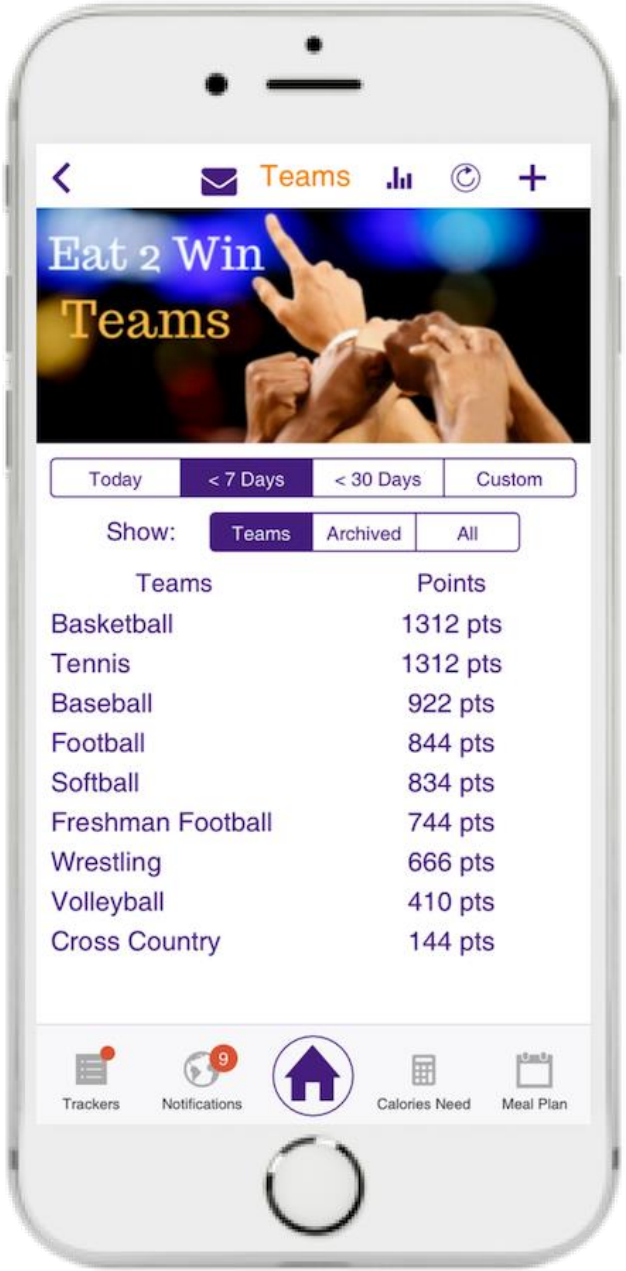


Step #6
Join a Team

- Grouping Athletes for Data Comparison
- Have Fun while Increasing User Engagement
- Compete While Improving Eating Habits
- Encouragement, Accountability and Team Synergy
- Points Scored are from Eat 2 Win App Engagement

TEAMS

Administration Reference Only
Remove for Team Meeting or Use to Explain how Teams will Compete



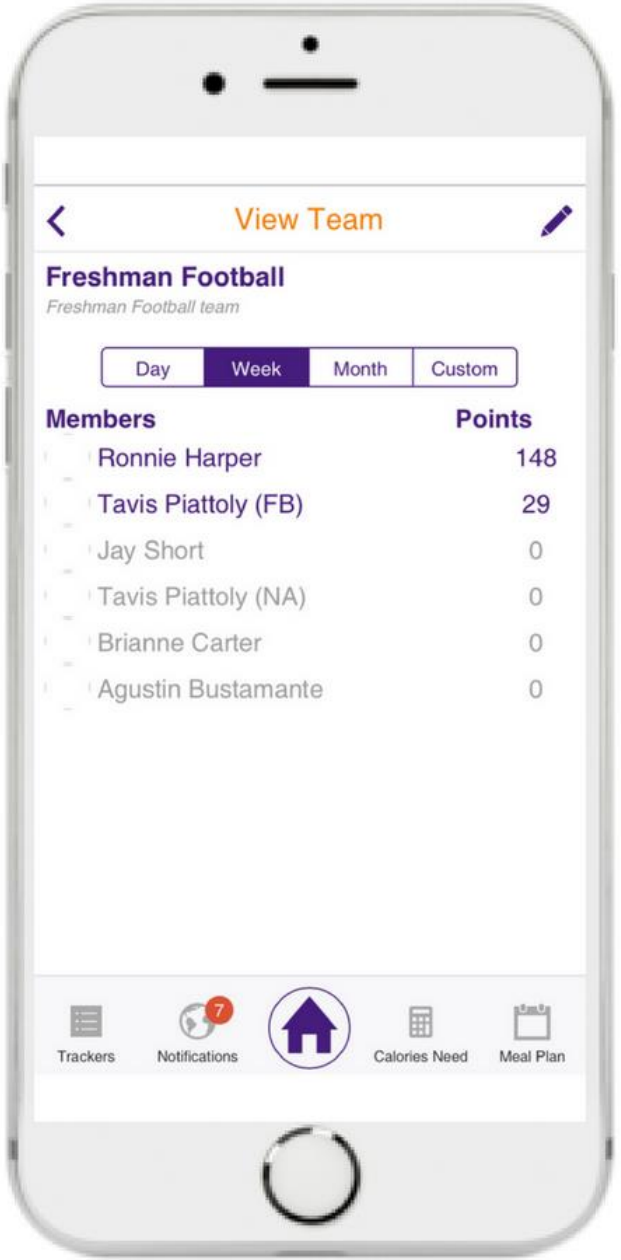
Create a Team & Add Athletes

Note:

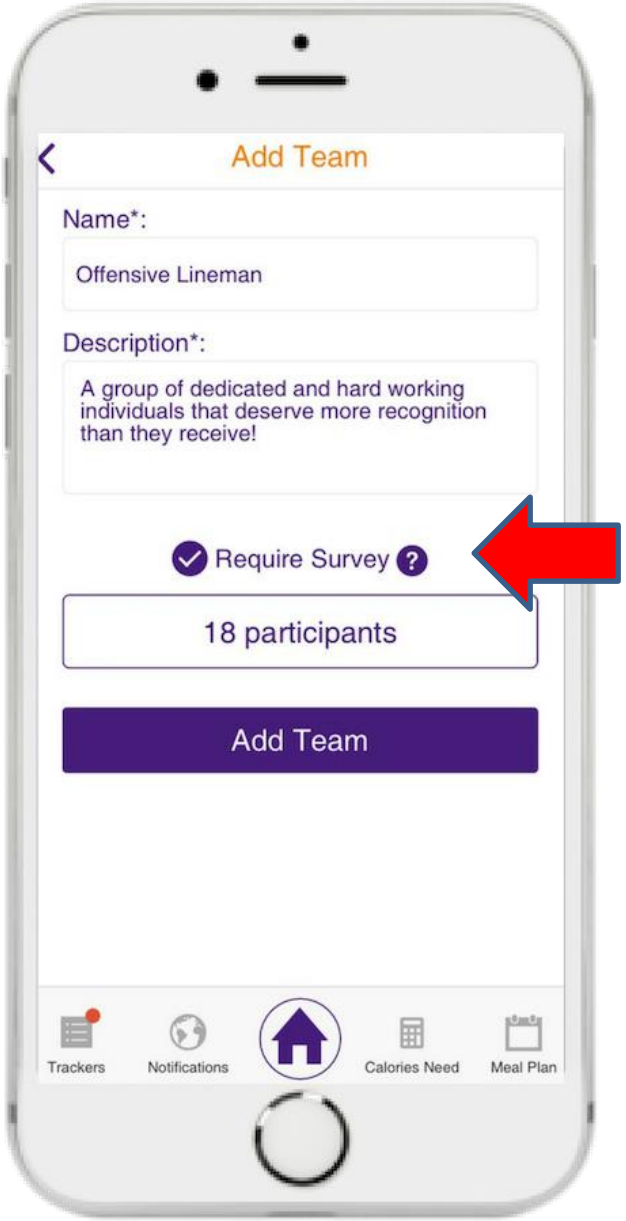
- Administrator must establish **FRIEND** status with Athlete before adding them to a **TEAM**.

- Be **CREATIVE** with how you **GROUP** your athletes. Athlete can be on multiple teams.

- Once athlete is **ADDED** to a Team they will receive a **NOTIFICATION** to join.



When Creating a Team Adding SURVEY is Optional



Review Survey Questions with Athletes

If you choose to include the survey, it will be sent to athletes to answer **BEFORE** joining a **TEAM**. All of the Athlete's Nutrition Monitors will be able to view survey results.

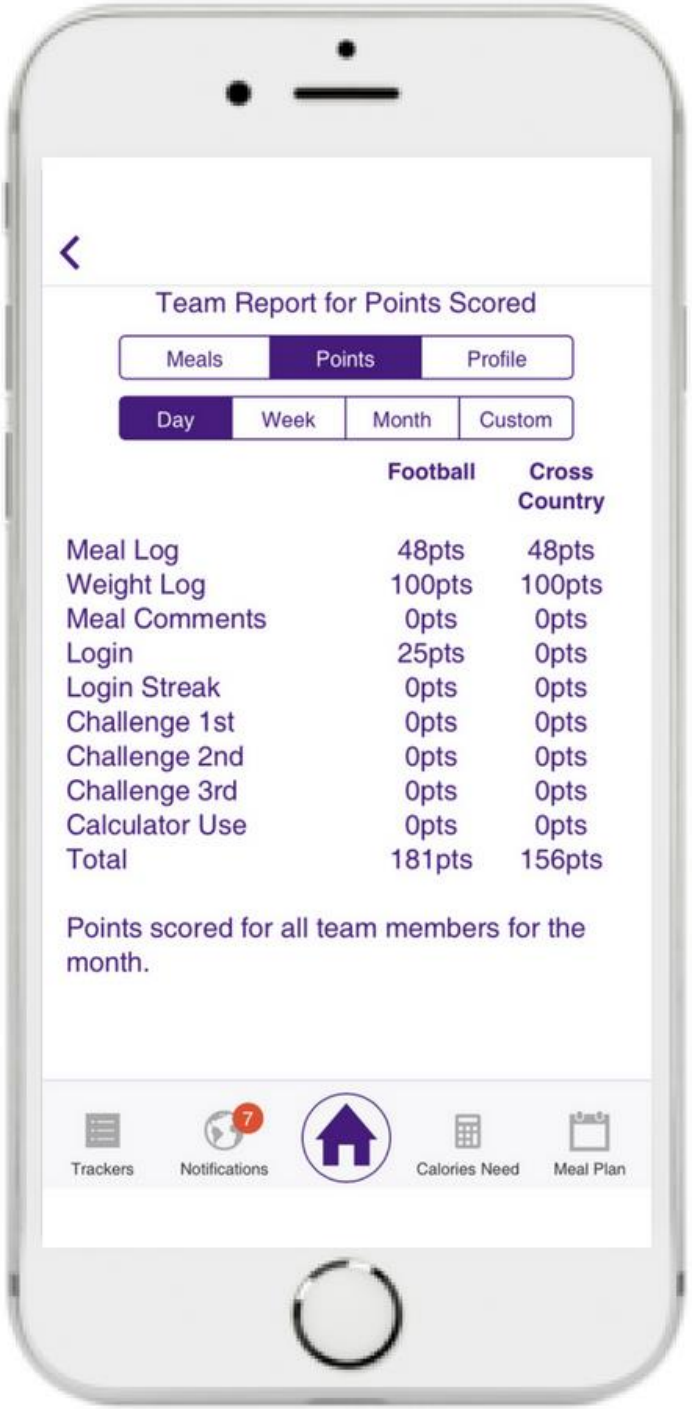
1. Grade/Classification
2. Sport(s)
3. Position(s)
4. Do you have any medical problems diagnosed by a Physician, if so explain?
5. Do you have any food allergies, if so explain?
6. Are you currently taking any medications, if so explain?
7. Are you taking any vitamins, supplements or herbs, if so explain?
8. What is your biggest challenge when trying to eat healthy?
9. What do feel you do well with your diet?
10. Briefly explain your workout (weight lifting and conditioning) schedule?
11. Briefly explain your practice, game or match schedule during these next 3 months?
12. What are 1-2 specific goals you desire to achieve when working with a Sports Dietitian?

Team Reports
Meals Logged

Administration Reference Only
Remove for Team Meeting
Data only Viewable by Administrator

Reports for 1-2 Teams on % of Meals Logged

- Day
- Week
- Month
- Custom



Team Reports
Point Scored

Administration Reference Only
Remove for Team Meeting
Data only Viewable by Administrator

How points are scored by:

- Day
- Week
- Month
- Custom

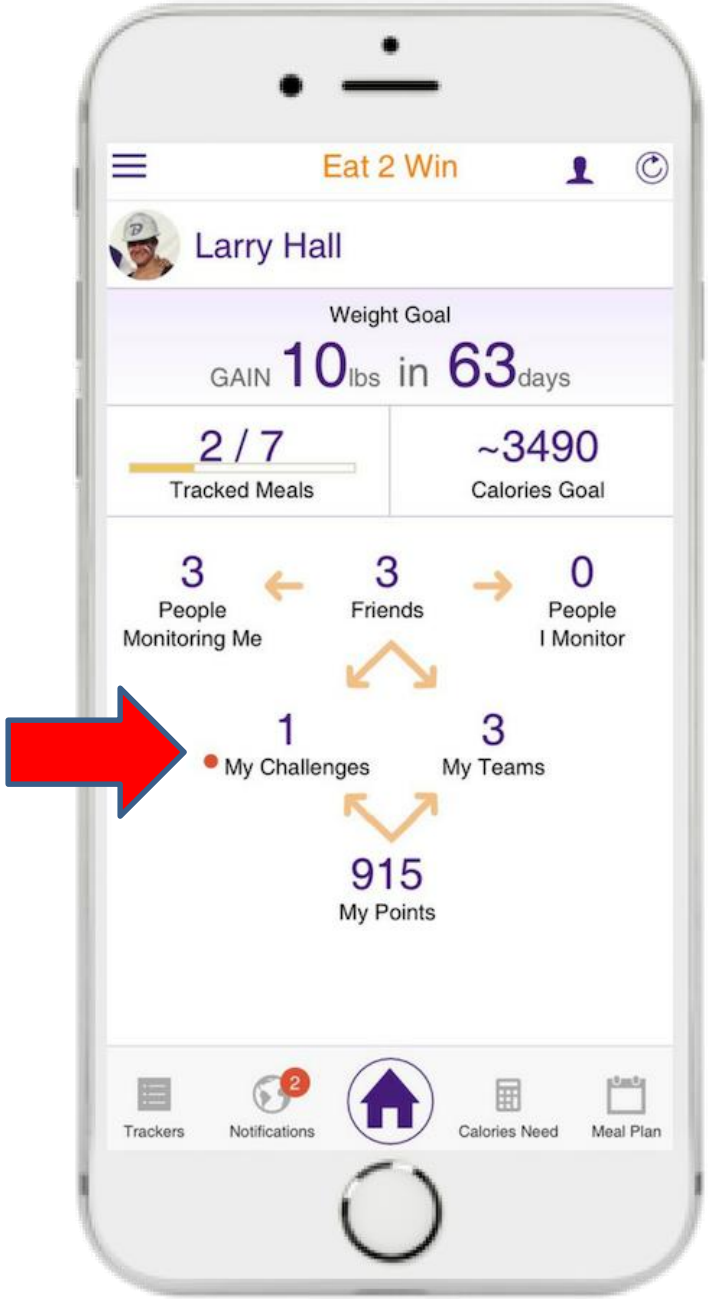
Team Reports Profile

Administration Reference Only
Remove for Team Meeting
Data only Viewable by Administrator

Teams are compared by:

- Age
- Height
- Weight
- Caloric Needs

Eat 2 Win: The Game Plan



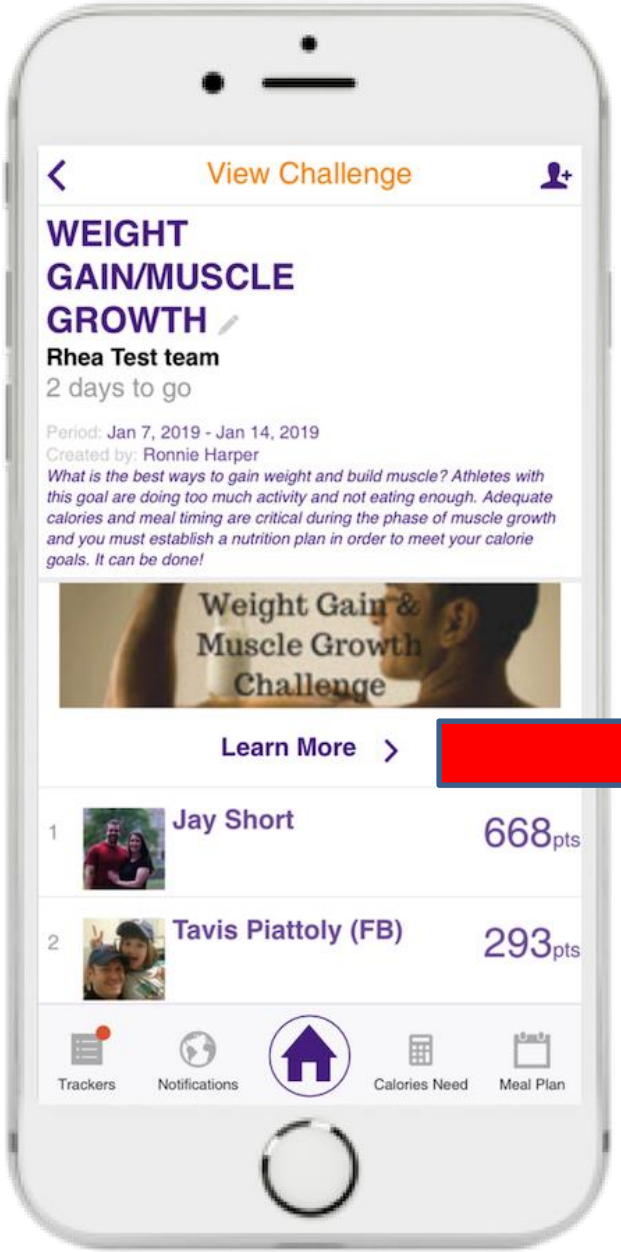
Step #7
Join a Challenge

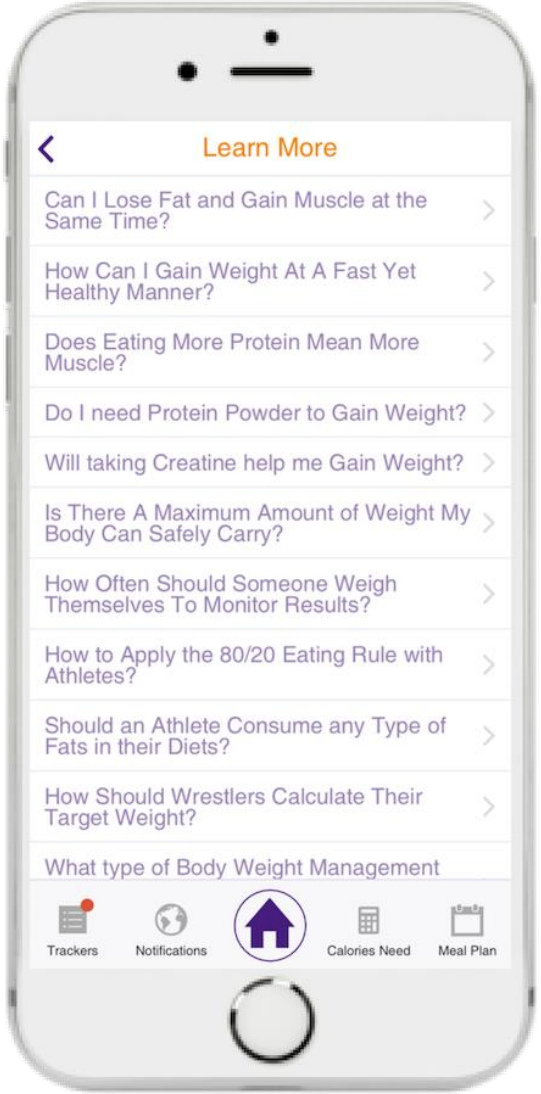
- Focus on Short Term Goals Based on a Theme
- Have Fun with Competition within Challenges
- Change One Habit at a Time
- Develop a Year-Round Sports Nutrition Program

Challenges: Short Term Goals

Theme Challenges

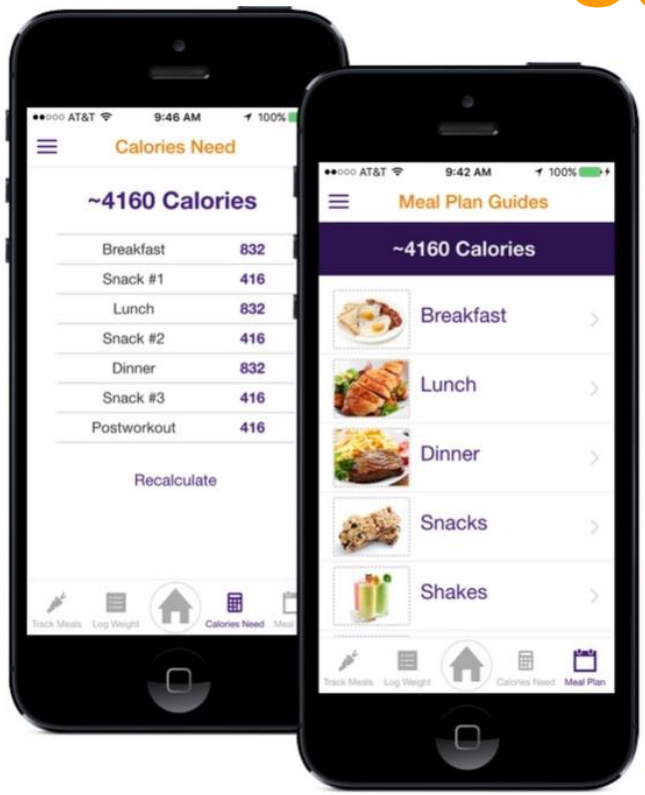
- Breakfast
- Hydration
- Meal Timing
- Nutritional Planning
- **Weight Gain/Muscle Growth**
- Weight Loss/Fat Loss
- Eating Out
- Snacks
- Sleep and Recovery
- Post-Workout
- Create Your Own Challenge





~1 minute video response per FAQ developed by a Sports Dietitian per Theme

<Remove Image and Outline Your Team's Game Plan for the Year>



Out-of-Season

Pre-Season

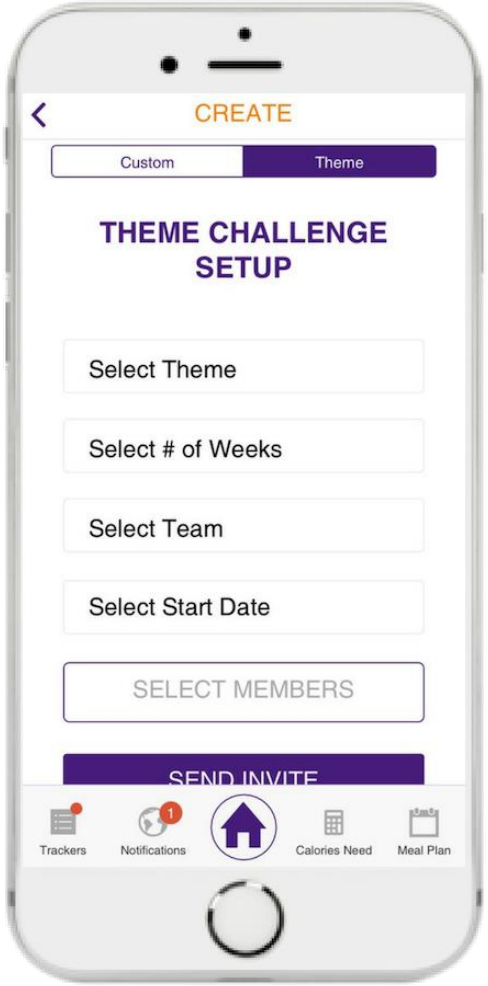
In-Season

Challenges	
Weeks	Theme
3	Post-Workout Nutrition
3	Importance of Breakfast
2	Snacks for Energy
2	Strategies for Eating Out
2	Benefits of Meal Timing
1	Hydration for Performance
1	Role of Fruits & Vegetables
1	Sleep & Muscle Recovery

Sample Game Plan

Theme Challenges
Example Game Plan for Multiple Teams

February			
TEAMS	**WEEKS**	**THEME**	**SEASON**
OL vs DL	3	Post-Workout	Out-of-Season
RB/WR vs DB/LB	3	Post-Workout	Out-of-Season
BBB vs GBB	1	Sleep/Recovery	In-Season
Bb vs Sb	2	Breakfast	Pre-Season
TK/CC vs TK/SP	2	Hydration	Pre-Season

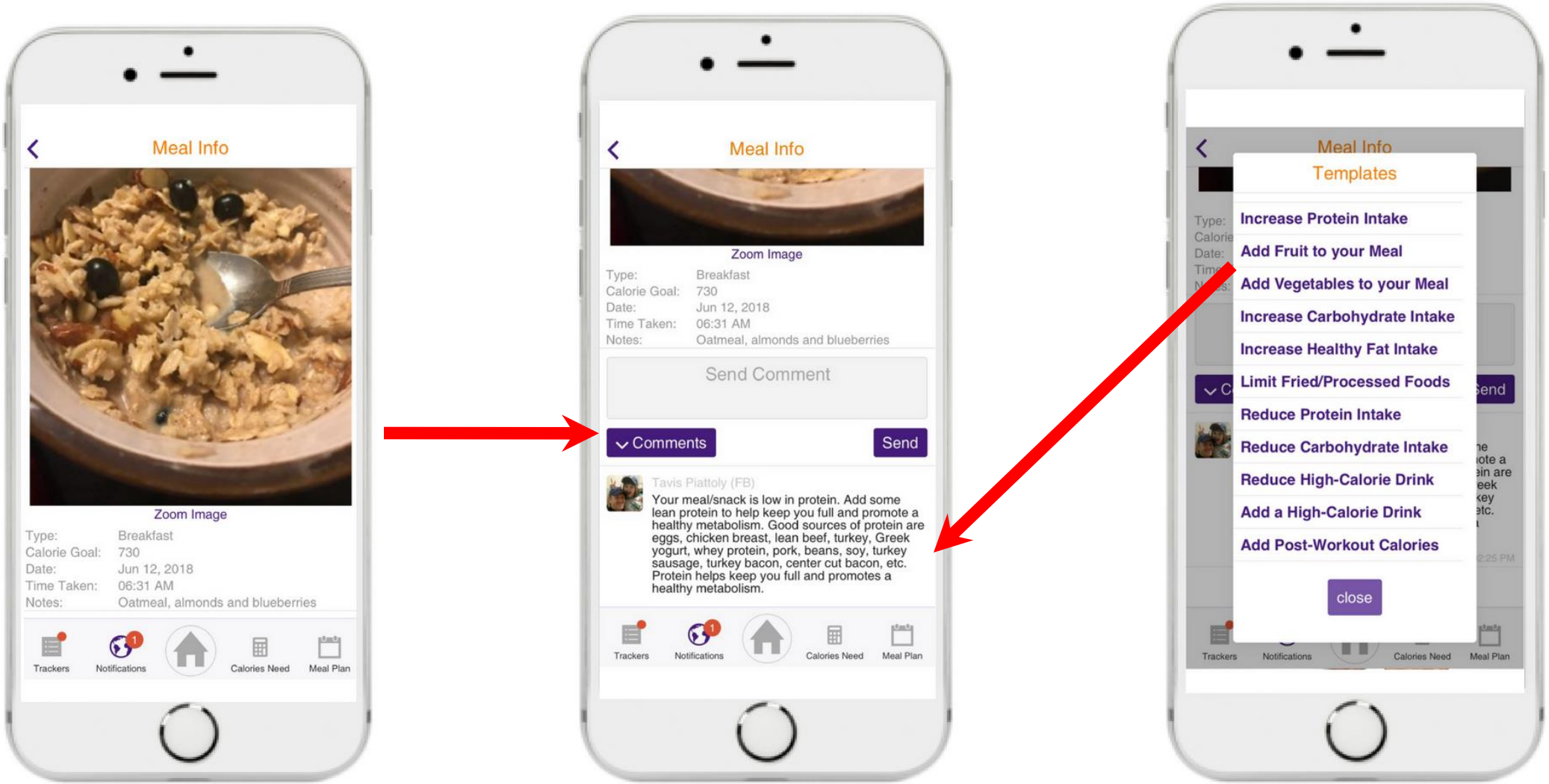


Create and Customize Your Program

How to Track Meals

Meal Commenting Feedback Template Statements

Administration Only Feature: Remove Slide for Team Presentation



- Athlete Logs Meal Picture
- Nutrition Monitors Notified

- Quickly Insert Template Statements to Expedite Feedback Process.
- Statements Developed by a Sports Dietitian and can be Edited.

Sports Dietitian Team Services

What program staff members receive from a Sports Dietitian:

- Consult with staff to implement a year-round sports nutrition program
- Assist staff with making recommendations to athletes/parents on body weight goals
- Sports Dietitian access by phone or email to answer sports nutrition related questions
- Guidance on pre-game meal menu development
- Bi-Weekly Q&A sessions with a Sports Dietitian
- Monthly webinars on a sports nutrition related topic
- Consult with staff on fueling strategies for travel or tournaments/events
- Provide a quarterly report on sports nutrition plan progress, meet and make adjustments
- Work closely with Athletic Training Staff (if available) regarding any potential Medical Nutrition Therapy needs.

Sports Dietitian Team Services

What each ATHLETE receives from a Sports Dietitian:

- Performance weight goal recommendation based on nutrition and activity assessment
- Customized nutrition/meal plan based on body weight and performance goals
    - Breakfast, Lunch, Dinner, and Snack options based on calorie needs
    - Performance Nutrition Smoothie Recipes
    - Post Workout Nutrition Recommendations
    - Over 12,000 Healthy Restaurant Choices
- Participate in up to 10 Theme Sports Nutrition Challenges
- Bi-Weekly Q&A Sessions with a Sports Dietitian
- Monthly webinars on a sports nutrition related topic
- Email access to a Sports Dietitian for questions
- Feedback from a Sports Dietitian on logged meal pictures during Theme Challenges
- Dietary supplement safety education to ensure any supplement currently taken complies with 3rd party testing certification and is free of banned substances

TEAM Theme Challenges

Out-of-Season

Pre-Season

In-Season

Challenges	
Weeks	Theme
3	Post-Workout Nutrition
3	Importance of Breakfast
2	Snacks for Energy
2	Strategies for Eating Out
2	Benefits of Meal Timing
1	Hydration for Performance
1	Role of Fruits &Vegetables
1	Sleep & Muscle Recovery

Sample Game Plan

Program Outcome Measures

Body Weight Goals Update

- Individual Progress
- Group (Team) Progress

Theme Challenges

- Athlete Ranking per Challenge
- Team Ranking per Challenge

Program Outcome Measures

Group (Team) Data

- Percentage of Meals Tracked per Theme Challenge
  - Breakfast, Lunch, Dinner, Snacks and Post workout
- Profile Average
  - Height, Weight, Age and Weight Goal
- Average Caloric Demands per Group (Team)
  - Breakfast, Lunch, Dinner, Snacks and Post workout

Program Outcome Measures

Group (Team) Data

- **Points Scored**
  - Breakfast, Lunch, Dinner, Snacks and Post workout
- **Nutritional and Lifestyle Assessment (*Coming Soon*)**
  - Letter grade average (A, B, C, D or F) per:
    - Breakfast, Lunch, Dinner, Snacks and Post workout
- **Lifestyle Dynamics Profile (Coming Soon)**
  - Motivations to Eating Healthy
  - 0bstacles to Eating Healthy
  - Influences to Eating Healthy

Program Outcome Measures

Quarterly Survey on Program Effectiveness

- Athletes
- Parents
- Staff

Communication

- Athlete & Parent email interactions
- Staff interactions
  - Email
  - Phone

Nutrition Monitors

Theme Challenges

Short-Term Goals

The Eat 2 Win Team

Questions or Feedback

Eat 2 Win Nutrition

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